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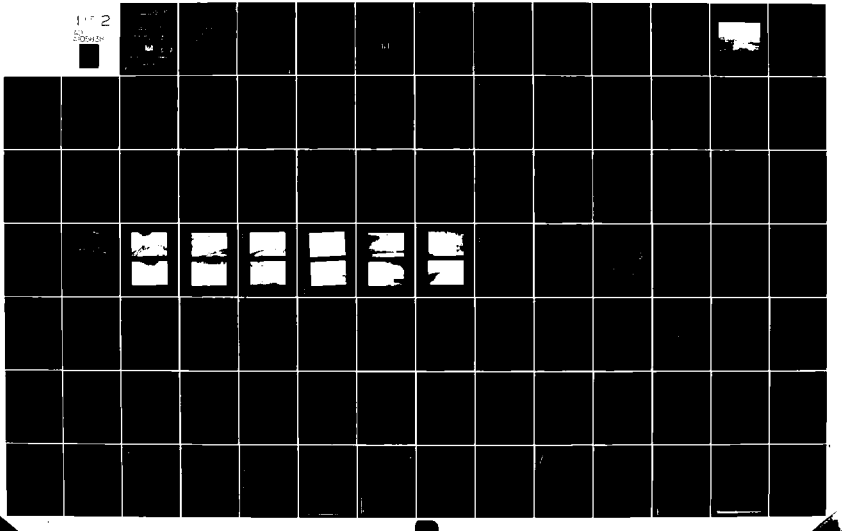

LEVEL II

GENESEE RIVER BASIN

WISCOY DAM

ALLEGENY COUNTY, NEW YORK
INVENTORY No. N.Y. 461

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT. CORPS OF ENGINEERS

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AUGUST 1981

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Wiscoy Dam
Genesee RiverBasin
Allegany County

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life and property. However, the dam has some deficiencies which require further investigation and remedial action.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

The hydrologic/hydraulic analysis performed indicates that the spillway does not have sufficient capacity to discharge the peak outflow from one-half the Probable Maximum Flood (PMF). However, spillway discharges occurring during large storm events will cause water surface elevations in the downstream hazard area to rise to flood levels. A dam failure resulting from overtopping would not significantly increase the hazard to loss of life from that which would exist just prior to an overtopping failure. Therefore, the spillway is assessed as inadequate.

The original design calculations for the dam were reviewed, and both the internal compressive stresses and the thrust on the rock at the abutments are satisfactory. However, numerous minor leaks through the dam were observed during the visual inspection. Therefore, additional investigations by a qualified registered professional engineer to determine the cause of the leakage and appropriate method of repair are recommended.

The investigation should be completed within 12 months of notification to owner, and remedial actions resulting from the investigation completed in the subsequent 12 months.

The following remedial measures should be performed within 1 year of notification to owner:

- Repair the gate hoist and sluice gate controlling the reservoir drain.
- Provide a means of access to the reservoir drain sluice gate.
- Clean the principal spillway trash racks of accumulated debris.
- Fill the construction opening in the base of the dam to eliminate leakage and to eliminate the hazard this condition poses.
- Post warning signs to discourage trespassers.
- Implement a program of diligent and periodic maintenance including but not limited to: operation and lubrication of the reservoir drain, patching spalled and eroded concrete areas and clearing debris from trash racks.
- Develop a formal written downstream warning system to alert the appropriate officials and residents in the event of an emergency.
- Develop and maintain a program of biannual technical inspections.

GENESEE RIVER BASIN

WISCOY DAM

ALLEGENY COUNTY, NEW YORK
INVENTORY No. N.Y. 461

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT, CORPS OF ENGINEERS

AUGUST 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the Investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event a finding that a spillway will not pass the Test Flood should not be interpreted as necessarily posing a highly inadequate condition. The Test Flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Wiscoy Dam
State Located:	New York
County Located:	Allegheny
Stream:	Wiscoy Creek
Basin:	Genesee River
Date of Inspection:	May 20, 1981

ASSESSMENT

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life and property. However, the dam has some deficiencies which require further investigation and remedial action.

The hydrologic/hydraulic analysis performed indicates that the spillway does not have sufficient capacity to discharge the peak outflow from one-half the Probable Maximum Flood (PMF). However, spillway discharges occurring during large storm events will cause water surface elevations in the downstream hazard area to rise to flood levels. A dam failure resulting from overtopping would not significantly increase the hazard to loss of life from that which would exist just prior to an overtopping failure. Therefore, the spillway is assessed as inadequate.

The original design calculations for the dam were reviewed, and both the internal compressive stresses and the thrust on the rock at the abutments are satisfactory. However, numerous minor leaks through the dam were observed during the visual inspection. Therefore, additional investigations by a qualified registered professional engineer to determine the cause of the leakage and appropriate method of repair are recommended.

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- Develop a formal written downstream warning system to alert the appropriate officials and residents in the event of an emergency.
- Develop and maintain a program of biannual technical inspections.

Robert J. Farrell, P.E.
New York No. 55983

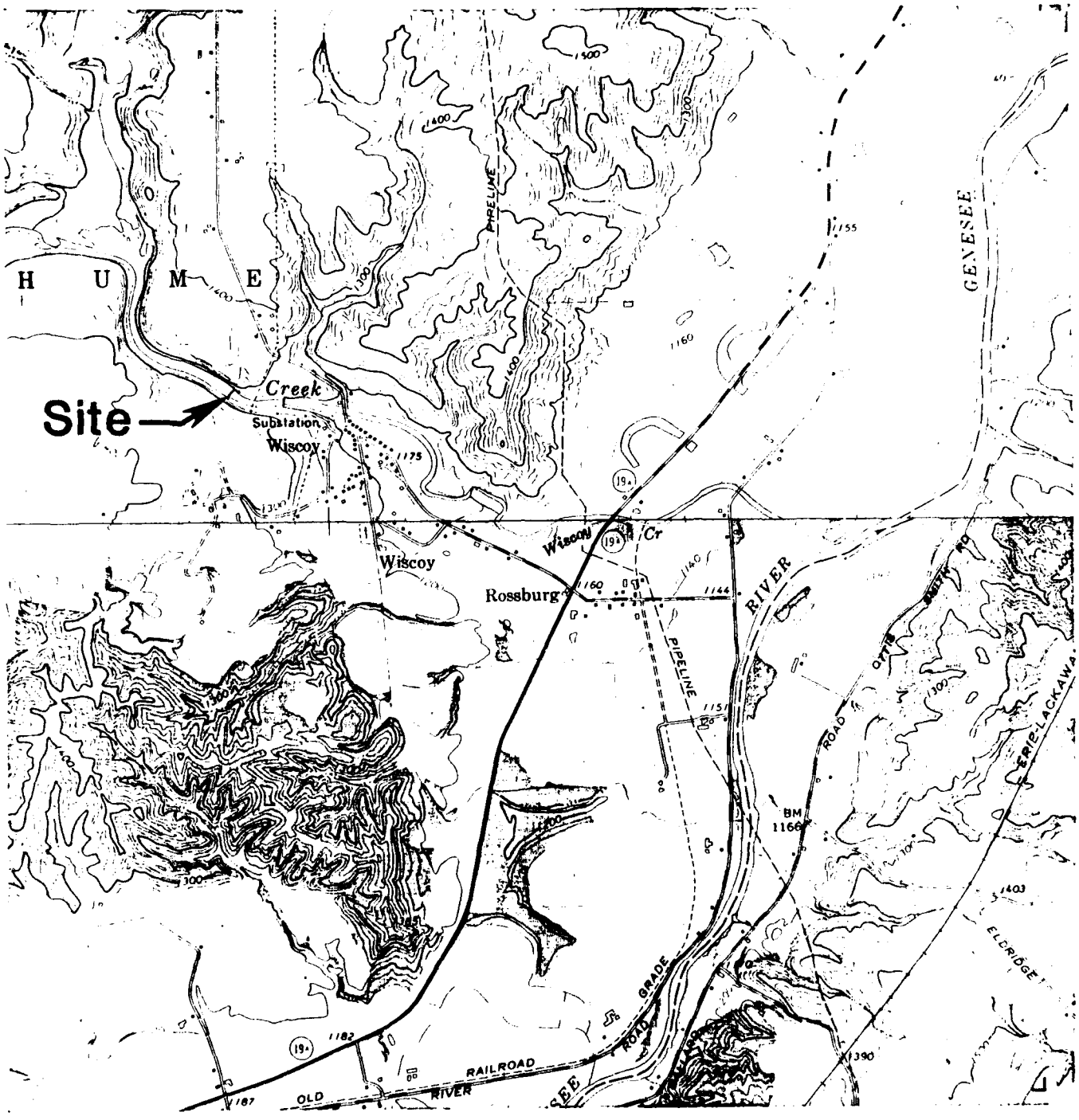
Approved by:

Col. W.M. Smith, Jr.
New York District Engineer

Date: 27 Aug 81

Wiscoy Dam

OVERVIEW



Wiscoy Dam

LOCATION PLAN

Scale: 1"= 2000'

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

WISCOY DAM

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a) Authority

The Phase I Inspection reported herein was authorized by the New York District Corps of Engineers in a letter dated February 24, 1981, in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367, dated August 8, 1972.

b) Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF THE PROJECT

a) Description of Dam and Appurtenances

Wiscoy Dam is a concrete arch dam with a crest length of approximately 240 ft. between the abutments. The dam has a maximum height of 33 ft. and a crest width of 5 ft. The north abutment is 14.5 ft. long and has an elevation of 1270.0 ft. (MSL). The south abutment is 22.5 ft. long and has an elevation of 1269.5 ft. (MSL). The downstream dam face has a slope of 1V:0.15H while the upstream slope is vertical.

According to available contract drawings , the dam is constructed of unreinforced concrete except for the top 10 ft. which is reinforced with #4 bars on 12 in. centers placed vertically and horizontally in both faces.

The principal spillway consists of a triangular metal drop inlet structure that drains into a gate controlled wood penstock that feeds two generators at R G & E substation No. 170.

The triangular metal drop inlet structure with trash racks is attached to the dam 45 ft. from the south abutment and extends approximately 10 ft. into the reservoir. The spillway has a crest elevation of 1261.5 ft. (MSL). Above the spillway is a metal grate platform and walkway at elevation 1270.0 ft. (MSL) which supports the gate hoist.

The inlet structure is drained by a 60 in. diameter wood penstock operated by a vertical lift sluice gate. It is approximately 1500 ft. long and drops approximately 44 ft. over that length from an invert elevation of 1234.0 ft. (MSL) at the upstream face of the dam. The penstock is supported by concrete cradles at 10 ft. intervals between the dam and the powerhouse.

The emergency spillway is 37 ft. wide, 0.6 ft. deep and is located 17 ft. south of the north abutment with a crest elevation of 1263.4 ft. (MSL).

A reservoir drain consisting of a 4 ft. by 4 ft. opening in the dam with an invert elevation of 1235 ft. (MSL) is located just north of the principal spillway. The flow is regulated by a vertical lift sluice gate on the downstream face of the dam.

A 10 ft. by 3 ft. construction opening is located at the base of the dam and has been closed on the upstream face with timber and two reinforcing rods.

b. Location

The dam is located approximately 1/4 mile west of Wiscoy, New York in the Town of Hume.

c. Size Classification

The dam is 33 ft. high and the reservoir has a storage capacity of 150 acre-ft. at elevation 1264.0 (top of dam). The dam is classified as "SMALL" in size (25 to 40 ft. in height or 50 to 1,000 acre-ft. of storage).

d. Hazard Classification

The dam is classified as HIGH hazard due to the significant economic losses and high potential for loss of life downstream in the event of dam failure.

e. Ownership

The dam is owned and operated by :

Rochester Gas & Electric Corporation
89 East Avenue
Rochester, New York 14604
Tele:(716) 546-2700, Ext. 2347

f. Purpose of Dam

Wiscoy Dam was constructed for the purpose of generating hydro-electric power. The powerhouse is equipped with two generators which produce 1 megawatt of electricity.

g. Design and Construction History

The dam was designed by Gannett, Seelye & Fleming - Engineers of Harrisburg, Pa. in 1921. The original owner was the Filmore Electric Co., however, the current owner is Rochester Gas & Electric. For this inspection, copies of the correspondence, the dam application (2 sheets), design calculations (3 sheets), and design drawings were provided by the New York State Department of Environmental Conservation, Albany, New York.

h. Normal Operating Procedures

Water is released from the reservoir through the 60 in. penstock to the power generation facilities, and any excess is released over the emergency spillway and the top of dam.

1.3 PERTINENT DATA

a. Drainage Area

115.0 square miles

b. Discharge at Damsite

Maximum known flood at damsite	Unknown
Discharge from observed recent high water mark	1000 cfs
Emergency Spillway	
Maximum Pool (Elevation 1264.0 ft. (MSL))	60 cfs
Principal Spillway	
Maximum Pool (Elevation 1264.0 ft. (MSL))	305 cfs
Total Spillway Capacity at Maximum Pool Elevation	365 cfs
Total Spillway Capacity at South Abutment (Elevation 1269.5 (MSL))	9862 cfs

c. Elevation (U.S.G.S. Datum)

Top of Dam	1264.0 ft.
Normal Pool	1262.1 ft.
Principal Spillway	
Upstream Invert	1234 ft.
Downstream Invert	1190 ft.
Riser Crest	1261.5 ft.
Emergency Spillway Crest	1263.4 ft.
Upstream toe of dam	1231.0 ft.

d. Reservoir

Length of Normal Pool	3400 ft.
Length of Maximum Pool	3500 ft.

e. Storage

Normal Pool	122 acre-ft.
Maximum Pool	150 acre-ft.

f.	Reservoir Surface	
	Normal Pool	10.5 acres
	Maximum Pool	15 acres
g.	Dam	
	Type	Arch
	Length	240± ft.
	Maximum Height	33± ft.
	Top Width	5 ft.
	Side Slopes (V:H)	
	Upstream	Vertical
	Downstream	1:0.15
h.	Reservoir Drain	
	Type	Vertical Sluice Gate
	Dimensions	4 ft. x 4 ft.
	Invert	1235.0 ft.
i.	Principal Spillway	
	Type	Wooden Pipe
	Diameter	60 in.
	Location	South side at base of dam
	Support	Concrete cradle
	Upstream	Triangular metal drop inlet structure
	Downstream	Powerhouse with tailrace
j.	Emergency Spillway	
	Type	Rectangular Section
	Base Width	37 ft.
	Height	0.6 ft.
	Side Slopes	Vertical
	Location	North side

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

The stratigraphy in northern Allegany County consists of relatively undeformed flat-lying sedimentary rocks of upper Devonian Age (375-345 million years ago). The bedrock formations are interbedded shales, siltstone, and thin limestone beds of the Java Group, Hanover Shale Member (also correlates with the Wiscoy Sandstone Member). Bedrock is a gray-greenish-gray shale with occasional black shale bands, gray silty shale, thin limestone beds and many zones of calcareous nodules forming a homocline which dips southward to southwestward at approximately 40 feet per mile. Only minor folding and faulting are found in the region with no major or active faults known to exist in the area.

The Wiscoy Dam is in a region classified as Zone 3 seismicity, as shown on Figure No. 1 of the Recommended Guidelines for Safety Inpsections of Dams.

Glaciation of the area was extensive. During the glacial period (Pleistocene Epoch), spanning about 1.5 million years, the area was over-ridden many times by a thick continental ice sheet moving southward over the region, from Quebec and Ontario, eroding the rock and changing drainage patterns. Deposition is pebble to cobble gravel with coarse sand that are loosely packed alluvial fan and channel deposits of streams flowing on steep gradients.

2.2 SUBSURFACE INVESTIGATIONS

According to a "Memorandum Regarding Dam No. 565", (Wiscoy Dam) dated July 13, 1921, three 4 ft. deep test pits were dug into the south bank of Wiscoy Creek, and in a letter dated August 14, 1921 by Division Engineer, L.C. Hulburd, a test pit was excavated along the line of the cutoff trench near the center of the streambed. The exposed rock was a dense gray stone of fine texture and no open seams.

2.3 DESIGN RECORDS

Design records available for Wiscoy Dam include: (1) the original structural and hydraulic design calculations, (2) correspondence between the designer and various public agencies and (3) the original construction application.

2.4 CONSTRUCTION RECORDS

Available construction records include: (1) one "As-built" drawing showing plans, sections and details of the dam and appurtenant structures, (2) complete construction specifications and (3) correspondence between the owner, designer and various public agencies.

2.5 OPERATION RECORDS

No written maintenance or operation records exist for the dam.

2.6 EVALUATION OF DATA

The information contained on the "As-Built" drawing is inconsistent with observations made during this inspection. According to the "As-Built" a 28 ft. long emergency spillway is located next to each abutment. However, a 37 ft. long, 0.6 ft. deep, spillway was found 17 ft. south of the north abutment; at the south abutment a half round metal pipe 43 ft. long and 0.57 ft. higher than the top of the dam covered the former south emergency spillway.

The design drawings, do not show an inlet structure leading to the penstock. However, at inspection, a triangular metal inlet riser structure as discussed in Section 1.2a was observed.

The walkway leading to the platform actually begins at the south abutment whereas the plans show the walkway beginning on the stream bank and perpendicular to the channel.

The information obtained from the inspection and the available data was considered adequate for the Phase I inspection and evaluation.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

A visual inspection of Wiscoy Dam was made on May 20, 1981. The weather was sunny, and the temperature was in the mid-seventies. The reservoir level at the time of the inspection was at elevation 1262.1 ft. (MSL). 1.9 ft. below the top of the dam.

b. Foundation

Rock outcrops near the crest of the dam at the east abutment show a medium-gray to green siltstone with intermixed shale of the upper Devonian age. Generally, the rock is thin to medium bedded, slight to moderately weathered, and showing significant slaking. The exposed rock at the south abutment is similar to that at the north abutment with some minor groundwater weeps in isolated areas approximately 15 ft. above the downstream streambed.

c. Dam

Several deficiencies and areas of deterioration were noted. These include:

1. Minor leakage was observed at numerous locations on the downstream face of the dam. The rate of leakage varied. At some locations, the flow was only enough to keep the concrete wet; at others, a trickle was flowing down the face of the dam. Most of the leakage appeared to be emerging from construction joints. Effervescent stains cover much of the downstream face of the dam.

2. The rectangular sluice gate in the downstream face of the dam which is used to drain the reservoir is inoperative. It is leaking due to improper seating. The concrete in the vicinity of the sluice gate is eroded and spalled. A concrete buttress above the sluice gate designed to protect the gate hoist while the dam is being overtopped is seriously deteriorated. Reinforcing steel is exposed and approximately 8 in. of concrete has been eroded away.

3. Cracks, spalls and eroded areas were observed at many locations on the crest and downstream face of the dam.

4. Seepage was observed at the south abutment trickling along the embankment concrete interface.

5. Debris has accumulated on the trash racks of the principal spillway riser structure.

6. Leakage was observed at the 3 ft. by 10 ft. construction opening through the dam.

d. Spillway

Except for some debris that has collected on the trash racks, the principal spillway intake structure is in good condition. The concrete structure connecting the intake gates with the wood penstocks is seriously eroded. This is due to water flowing over the south emergency spillway section immediately above. This spillway section has been raised higher than the crest of the dam by installation of a half round pipe section.

The south emergency spillway is moderately eroded.

e. Reservoir Area

The sides of the reservoir are generally steeply sloping. The north side consists primarily of exposed rock, and the south side consists of rock with a light cover of scree and vegetation. The sides appear stable and in good condition.

f. Downstream Channel

The downstream channel consists of exposed bedrock that is somewhat more competent than that described at the abutments. High angle joints are common, cutting the rock into blocks with a platey appearance. Approximately 500 ft. downstream, the rock breaks at joint surfaces, creating a step like appearance. These steps are spaced 20 to 50 ft. apart and vary in the thickness from 5 to 10 ft. Fissures and bowls are common at the base of these steps indicating the rock is relatively soft and easily weathered.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection did not indicate any serious problems which would adversely affect the adequacy of the dam. The following is a summary of the problem areas encountered, in order of importance, with appropriate recommended action:

1. The gate hoist controlling the reservoir drain sluice gate should be made operational. The gate should be exercised and lubricated annually.

2. The reservoir should be lowered so that the condition of the concrete on the upstream face of the dam may be inspected.

3. Some debris has collected on the trash racks of the principal spillway inlet structure. This debris should be removed on an annual basis.

4. There are many areas where the concrete is cracked, spalled, and eroded. The more serious of these areas should be sealed or patched.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

No written operation and maintenance procedures exist for the project. The normal operation of the project consists of allowing water to flow through the penstock to the turbines in the powerhouse, and spilling any excess over the emergency spillway and top of dam.

4.2 MAINTENANCE OF DAM

The dam is not maintained on a regular basis. However, some improvements have been made. The raised crest on the south end of the dam prevents water from overflowing onto the concrete apron which houses the penstock during the initial stages of overtopping.

4.3 WARNING SYSTEM IN EFFECT

No warning system is in effect or in preparation

4.4 EVALUATION

The overall condition of the dam and appurtenant structures appears to be fair. Recommendations in connection with regular maintenance are discussed in Section 7.

5.5 EXPERIENCE DATA

There are no flood records for the dam site. However, during the field investigation, evidence of a recent high water mark was observed at elevation 1264.5 ft. (MSL), 0.5 ft. above the top of the dam. This reservoir elevation corresponds to a peak outflow of 1000 cfs.

5.6 OVERTOPPING POTENTIAL

The maximum capacity of the spillways is 9862 cfs which is less than the PMF peak outflow of 136,670 cfs and the 1/2 PMF peak outflow of 68,345 cfs. The dam is overtopped by the PMF and the 1/2 PMF, the peak elevations, respectively, being 24.1 ft. and 13.3 ft. above the south abutment.

5.7 ANALYSIS OF DOWNSTREAM IMPACTS

During the field investigation, dwellings and highways located downstream of the dam were identified and referenced to the channel invert. The cross section locations used in the downstream channel routing are shown on Page D-2, Appendix D. The impacts of the PMF on dwellings located downstream of the dam are shown in Table. 5.1 For the purposes of this analysis, a danger of loss of life was assumed to exist if the computed PMF water surface was above the first floor elevation of a structure. This situation occurs at all locations except locations 2 and 7, as well as the road being overtopped at locations 3 and 4. The potential danger of loss of life and economic damage is substantial enough to warrant classification as a HIGH hazard dam.

5.8 EVALUATION

The spillways of Wiscoy Dam will safely pass approximately 7% of the PMF without overtopping the abutments. The spillway is, therefore, assessed as inadequate.

ETL 1110-2-234, Section 5, gives the basis for determining whether or not a spillway should be classified as seriously inadequate. The results of this investigation indicate that the channel capacity downstream of the dam is greater than the discharge through the dam at the point where overtopping begins. There is, therefore, not a significant increase in the hazard to loss of life downstream of the dam from that which would exist just before overtopping failure. The spillway, then, is assessed as inadequate but not seriously inadequate. Potential problems include:

a. The danger of loss of life and economic damage downstream of the dam for floods in the 1/2 PMF to PMF range.

TABLE 5.1

SUMMARY OF DOWNSTREM IMPACT FOR PMF

Location # (See Pg. D-2 Appendix D)	Location	Number of Dwellings	Structure Height Above Streambed* (ft)	Peak Flow (cfs)	Peak Stage (ft)	Comments
-	At Dam	-	-	136,670	-	-
1	1800' d/s of Dam	1 house	13.5	136,711	17.4	Danger of loss of life
		2 houses	16.0	136,730	17.5	
		1 house	10.0	136,758	17.6	
		3 houses	13.5	136,758	17.6	
2	1050' d/s of Loc. 1	-	-	136,810	17.9	-
3	1800' d/s of Loc. 2	1 trailer	17.0	136,795	21.7	Danger of loss of life
		1 firehouse	17.0	136,795	21.7	
4	900' d/s of Loc. 3	1 house	16.0	136,819	22.7	Danger of loss of life
5	1800' d/s of Loc. 4	1 house	15+	136,899	17.9	Danger of loss of life
6	1640 d/s of Loc. 5	1 house	19.0	136,982	14.1	Danger of loss of life
		1 house	15.0	136,962	15.0	
		1 house	18.5	136,962	15.0	
		2 houses	22.0	136,962	15.0	
7	800' d/s of Loc. 6	1 house	17.5	136,974	16.0	

NOTE: Structure height above streambed is the difference in elevation of the dwelling's first floor elevation and the channel invert.

SECTION 6 - STRUCTURAL STABILITY

6.1 VISUAL OBSERVATIONS

No displacement or distress of the concrete arch dam was observed during this Phase I Inspection. Leakage through the dam was observed at many locations.

6.2 DESIGN AND CONSTRUCTION DATA

Design and construction records have been located at the New York State Department of Environmental Conservation, Albany, New York. The dam was designed by Gannett, Seelye & Fleming Engineers, Inc. in 1921. The original design information was reviewed as part of this Phase I Investigation. The following is a summary of design for the two loading conditions considered:

Case (1)	discharge	=46,000 cfs
	depth over crest	=15 ft.
	tail water	=15 ft. to 18 ft.
	maximum compressive stress at top of dam	=170 psi*
	maximum compressive stress at base of dam	=242 psi*
	thrust on abutment rock	=9.5 tons/sq.ft.
Case (2)	discharge	=17,250 cfs
	depth over crest	=8 ft.
	tailwater depth neglected	
	maximum compressive stress at top of dam	=90 psi*
	maximum compressive stress at base of dam	=232 psi*
	thrust on abutment rock	=9.7 tons/sq.ft.

Based on the existing conditions as revealed by the visual inspection and the review of the original design calculations, the dam is considered to possess adequate structural stability.

*Compression in concrete was computed using a formula given in Engineering and Contracting, June 8, 1921, p 567

6.3 OPERATING RECORD

No operating records could be located for the structure. The sluice gate for draining the reservoir cannot be operated in its present condition.

6.4 POST-CONSTRUCTION CHANGES

The south emergency spillway has been eliminated by installation of a half round pipe section raising the crest of dam approximately 6 in. The penstock intake structure has been modified since original construction.

6.5 SEISMIC STABILITY

The dam is located in Seismic Zone 3 and, in accordance with the Recommended Guidelines, a seismic stability analysis is warranted.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I inspection of Wiscoy Dam did not reveal conditions which constitute an immediate hazard to the human life and property of the downstream residents.

From the available data, the total spillway capacity is capable of discharging 7% of the PMF before overtopping the south abutment by 24.1 ft. This spillway is, therefore, judged to be inadequate.

b. Adequacy of Information

The information reviewed combined with a field investigation is considered adequate.

c. Need For Additional Investigation

The following investigations are required to be performed by a qualified registered professional engineer:

1. Investigate the cause of the leakage through the dam.

d. Urgency

The recommended investigation should be completed within 12 months of notification to owner, and remedial actions resulting from this investigation completed in the subsequent 12 months. The remedial measures or actions listed below should be completed within one year from notification to owner.

7.2 RECOMMENDED REMEDIAL MEASURES

1. Repair the leaking sluice gate on the reservoir drain and provide access to the gate hoist.

2. Clean the principal spillway trash racks of the accumulated debris.

3. Close the construction opening to eliminate seepage and the potential danger of the existing condition from opening.

4. Provide a program of periodic inspection and maintenance of the dam. Document this information for future reference.

5. Develop an emergency action plan for the dam.

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Wiscoy Dam

Fed. I.D. # 461 DEC Dam No. 565-G

River Basin Genesee River Basin

Location: Town Hume County Allegheny

Stream Name Wiscoy

Tributary of Genesee River

Latitude (N) 42° 30.3 Longitude (W) 078-05.3

Type of Dam Concrete Arch

Hazard Category High

Date(s) of Inspection May 19, 1981, May 20, 1981

Weather Conditions Sunny, 70°F

Reservoir Level at Time of Inspection 1262.1 ft. (MSL)

b. Inspection Personnel RickBrown, Ken Avery, Bob Farrell (EAA)
Jeff Hardin, Ray Kampff

c. Persons Contacted (Including Address & Phone No.) Albert Daubert
Rochester Gas & Electric
89 East Avenue
Rochester, N.Y. (716) 546-2700 Ext 2347

d. History:

Date Constructed 1921 Date(s) Reconstructed

Designer Gannett, Seelye & Fleming

Constructed by Unknown

Owner Rochester Gas & Electric

2) Embankment - Not Applicable

a. Characteristics

(1) Embankment Material_____

(2) Cutoff Type_____

(3) Impervious Core_____

(4) Interral Drainage System_____

(5) Miscellaneous_____

b. Crest

(1) Vertical Alignment_____

(2) Horizontal Alignment_____

(3) Surface Cracks_____

(4) Miscellaneous_____

c. Upstream Slope

(1) Slope (Estimate) (V:H)_____

(2) Undesirable Growth or Debris, Animal Burrows_____

(3) Sloughing, Subsidence or Depressions_____

(4) Slope Protection_____

_____

_____

(5) Surface Cracks or Movement at Toe_____

_____

d. Downstream Slope

(1) Slope (Estimate - V:H)_____

(2) Undesirable Growth or Debris, Animal Burrows_____

_____

(3) Sloughing, Subsidence, or Depressions_____

_____

_____

(4) Surface Cracks or Movement at Toe_____

_____

(5) Seepage_____

_____

_____

(6) External Drainage System (Ditches, Trenches, Blanket)_____

_____

_____

(7) Condition Around Outlet Structure_____

_____

(8) Seepage Beyond Toe_____

_____

e. Abutments - Embankment Contact

_____

_____

_____

(1) Erosion at Contact_____

_____

(2) Seepage Along Contact_____

_____

_____

3) Drainage System - Not Applicable

(a) Description of System _____

(b) Condition of System _____

(c) Discharge from Drainage System _____

4) Instrumentation (Momumentation/Surveys, Observation Wells, Weirs, Piczometers, etc.) None noted

5) Reservoir

a. Slopes Stable

b. Sedimentation Unable to observe due to reservoir level

c. Unusual Conditions Which Affect Dam None

6) Area Downstream of Dam

a. Downstream Hazard (No. of homes, highways, etc) See Table 5.1

b. Seepage, unusual growth Minor seepage near the south abutment

c. Evidence of movement beyond toe of Dam None

d. Conditions of Downstream Channel Good

7) Spillway(s) (including Discharge Conveyance Channel)

a. General The principal spillway is in good condition. However, the emergency spillway is in fair condition.

b. Condition of Service Spillway Good - trash racks need to be cleaned

c. Condition of ~~Auxiliary~~ Emergency Spillway Fair - there is considerable spalling along the section.

d. Condition of Discharge Conveyance Channel

3) Reservoir Drain/Outlet

Type: Pipe ____ Conduit ____ Other 4' x 4' opening in dam

Material: Concrete X Metal ____ Other ____

Size: 4' x 4' Length ± 5 ft.

Invert Elevations: Entrance 1235.0 Exit 1235.0

Physical Condition (Describe): Unobservable X

Material: ____

Joints: ____ Alignment ____

Structural Integrity: ____

Hydraulic Capability: ____

Means of Control: Gate Sluice Valve ____ Uncontrolled ____

Operation: Operable ____ Inoperable X Other ____

Present Condition (Describe): The gate is leaking and the hoist is inoperable.

3) Structural

a. Concrete Surfaces Spalling & erosion noted on crest, downstream face & penstock connecting structure. Significant at many locations.

b. Structural Cracking Noted on crest & downstream face. Minor.

c. Movement - Horizontal & Vertical Alignment (Settlement) None noted

d. Junctions with Abutments or Embankments Light seepage noted along downstream interface. May be ground water.

e. Drains - Foundation, Joint, Face None

f. Water Passages, Conduits, Sluices Could not inspect

g. Seepage or Leakage Leakage noted at many locations on face. Varies from insignificant to trickle. Usually at construction joint.

h. Joints - Construction, etc. Many leaking.

i. Foundation Could not observe except along downstream face which is excellent.

j. Abutments Good

k. Control Gates Reservoir drain in operative; gate for intake structure good

l. Approach & Outlet Channels N/A

m. Energy Dissipators (Plunge Pool,etc) None

n. Intake Structures Good

o. Stability Good

p. Miscellaneous

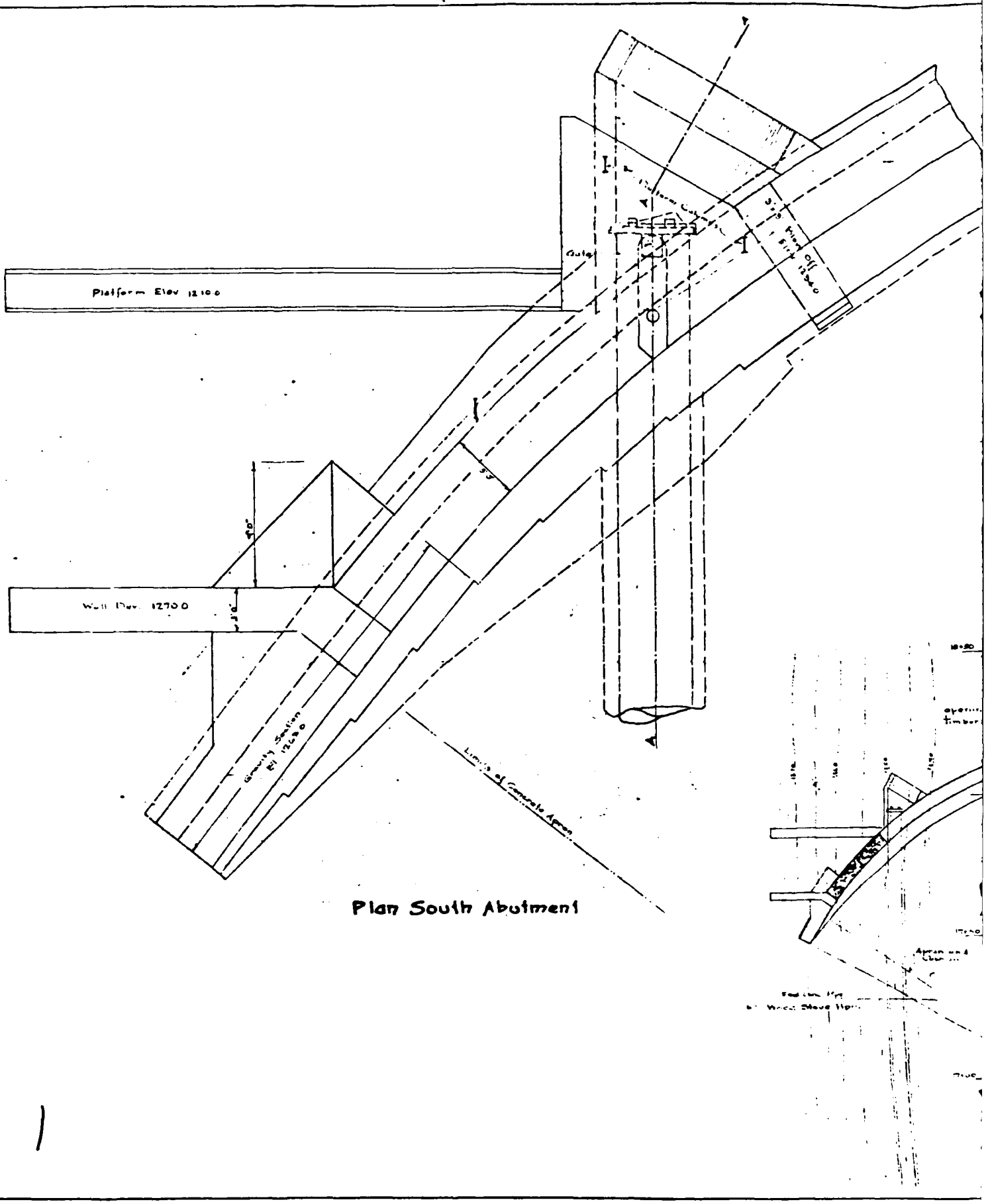
10) Appurtenant Structures (Power House, Lock, Gatchouse, Other)

a. Description and Condition The powerhouse is lcoated approximately 1500' downstream of the dam. It is in good condition and in use by R G & E producing 1 megawatt of electricity.

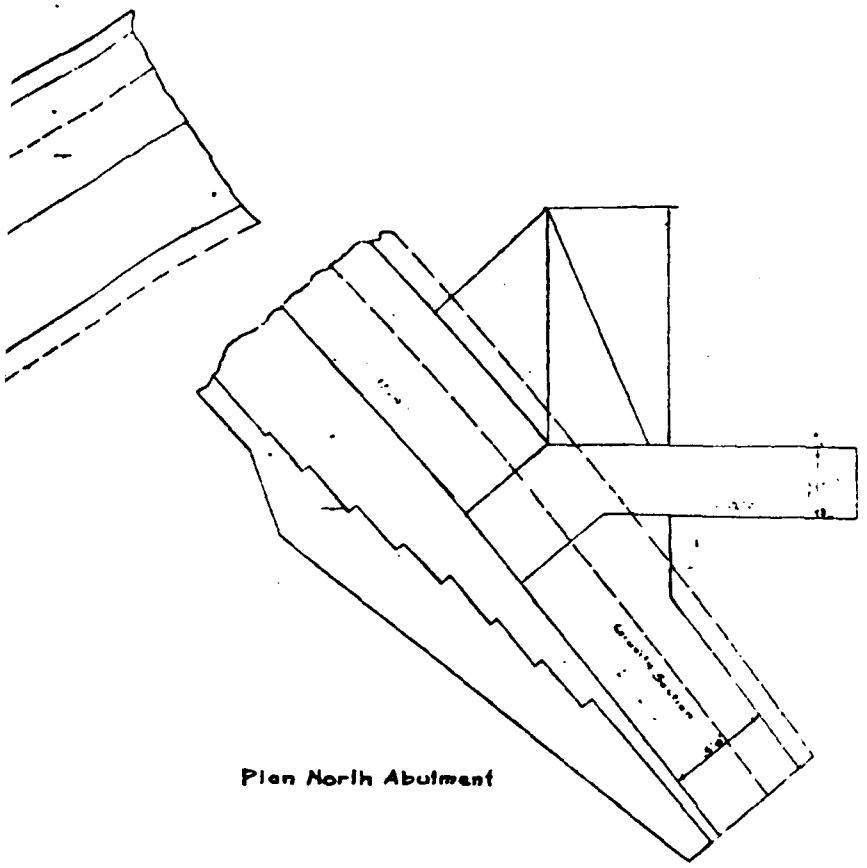
APPENDIX B

ENGINEERING DATA

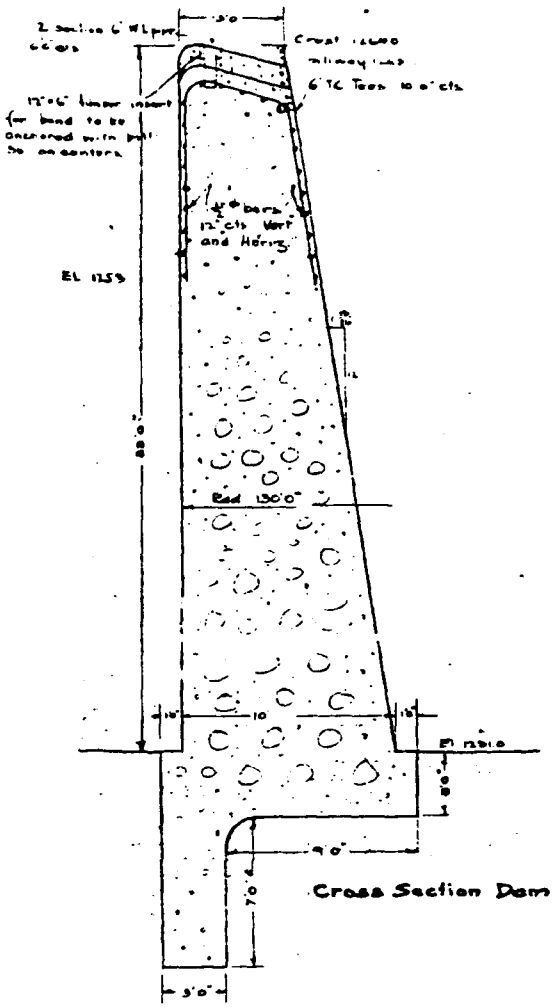
APPENDIX B

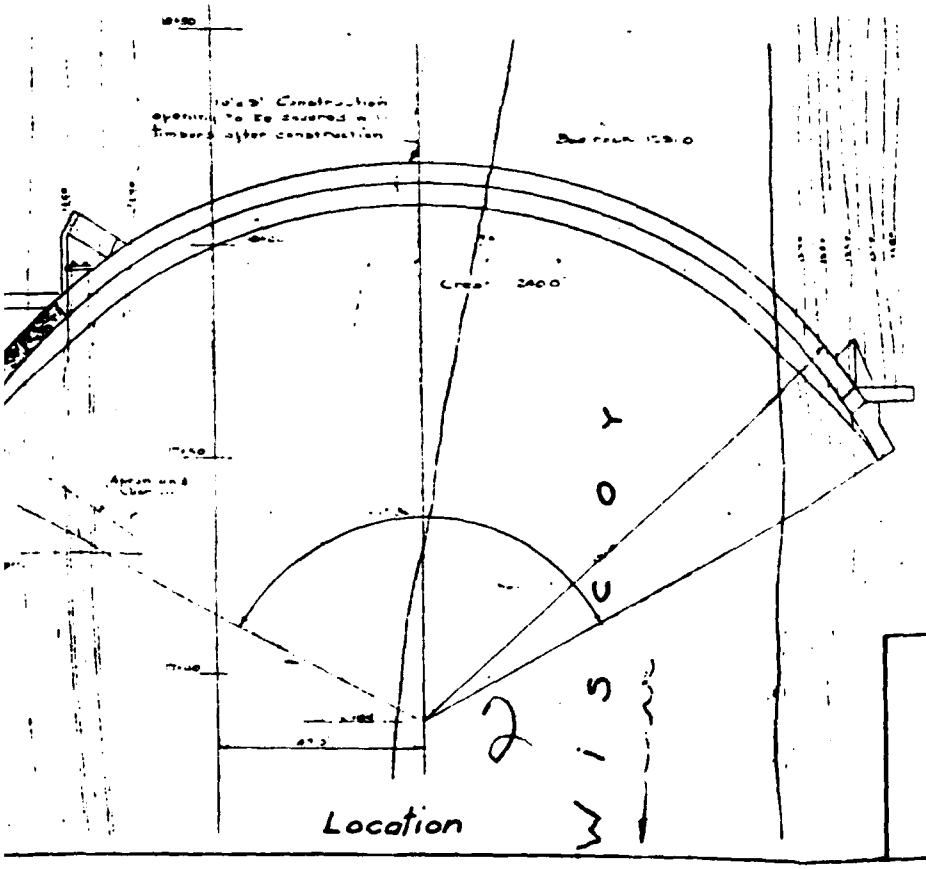


Plan South Abutment



Plan North Abutment



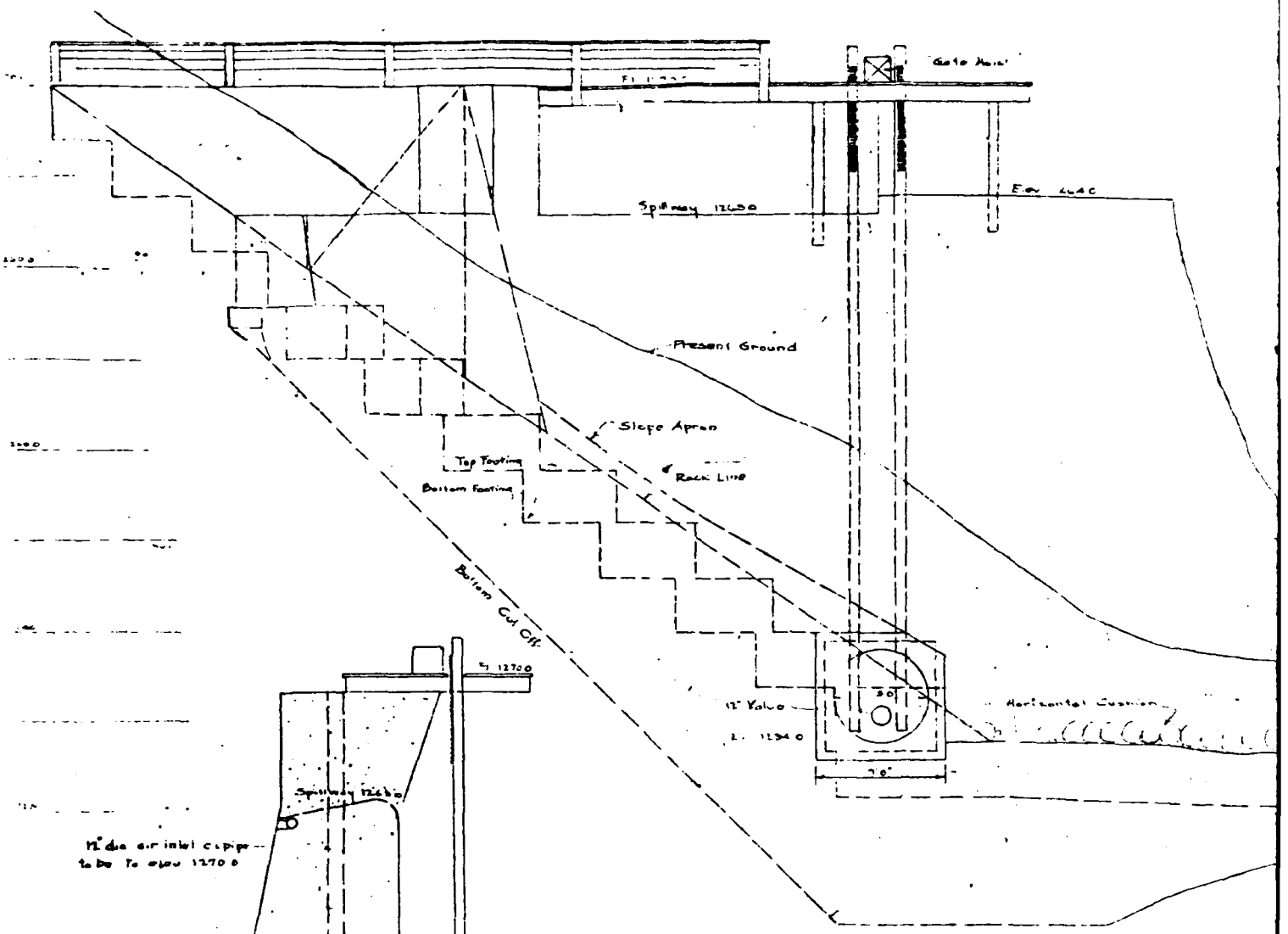


WISCOY ARCH DAM
for
FILLMORE-ELECTRIC-COMPANY
Fillmore, N.Y.

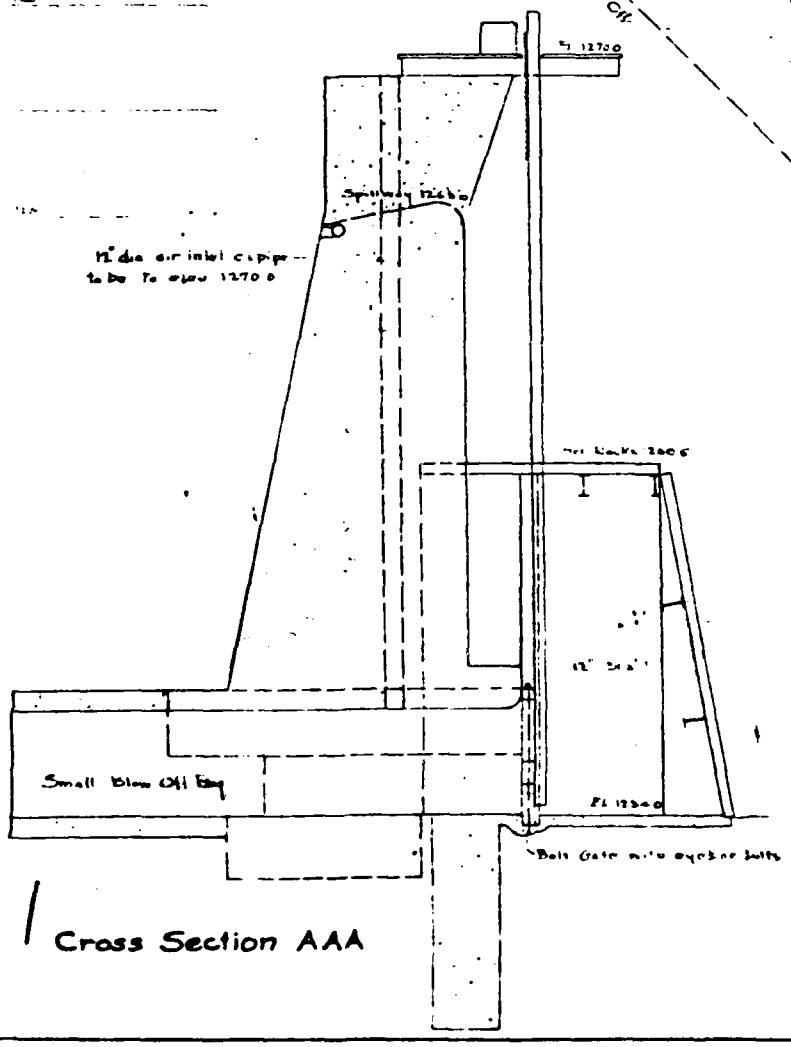
Gannett, Seelye & Fleming-Engrs
Erie, Pa. Hbg, Pa. Memphis Tenn.

June 9 1921

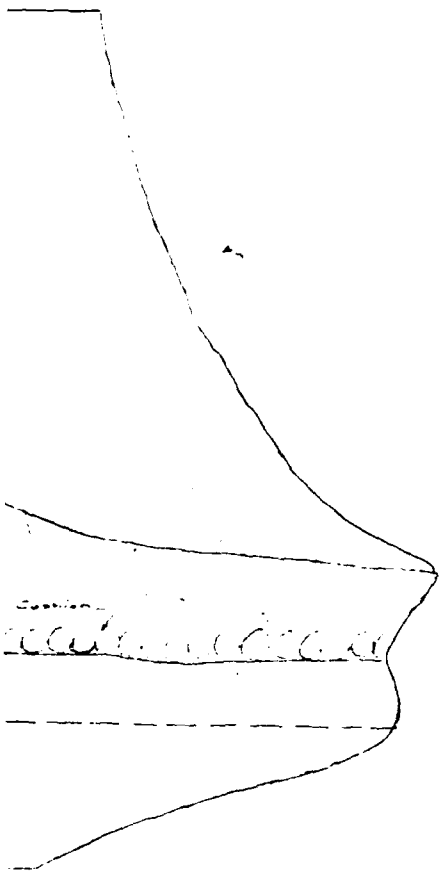
B-2

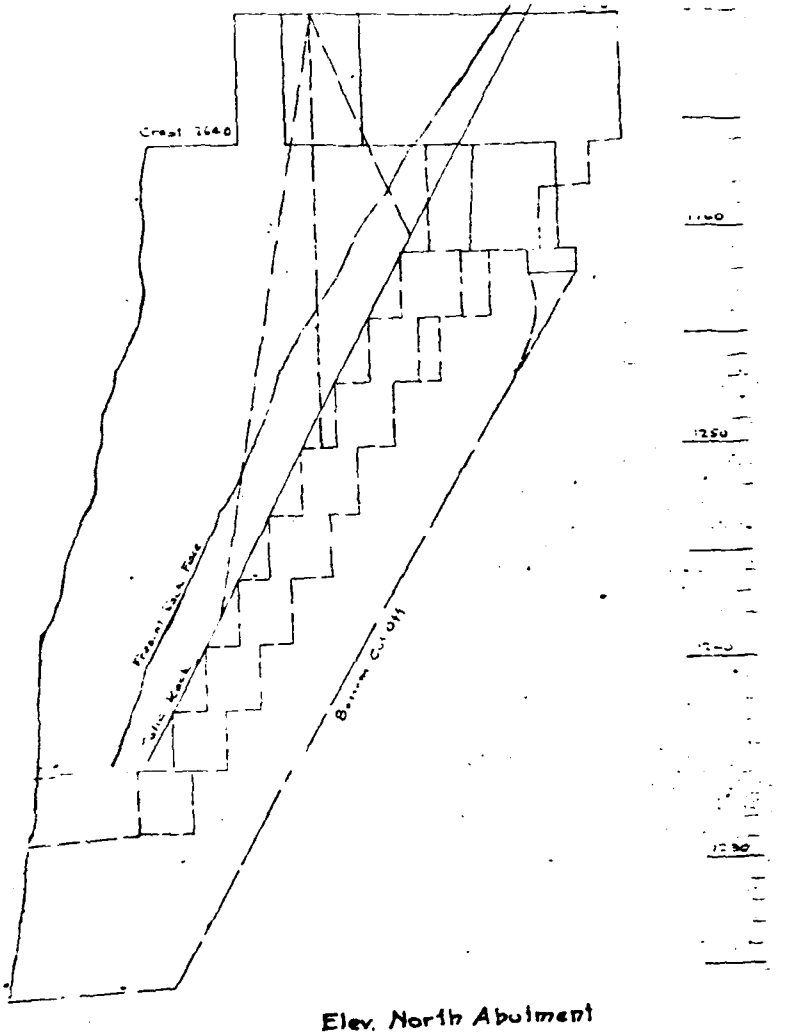


Elev. South Abutment



Cross Section AAA





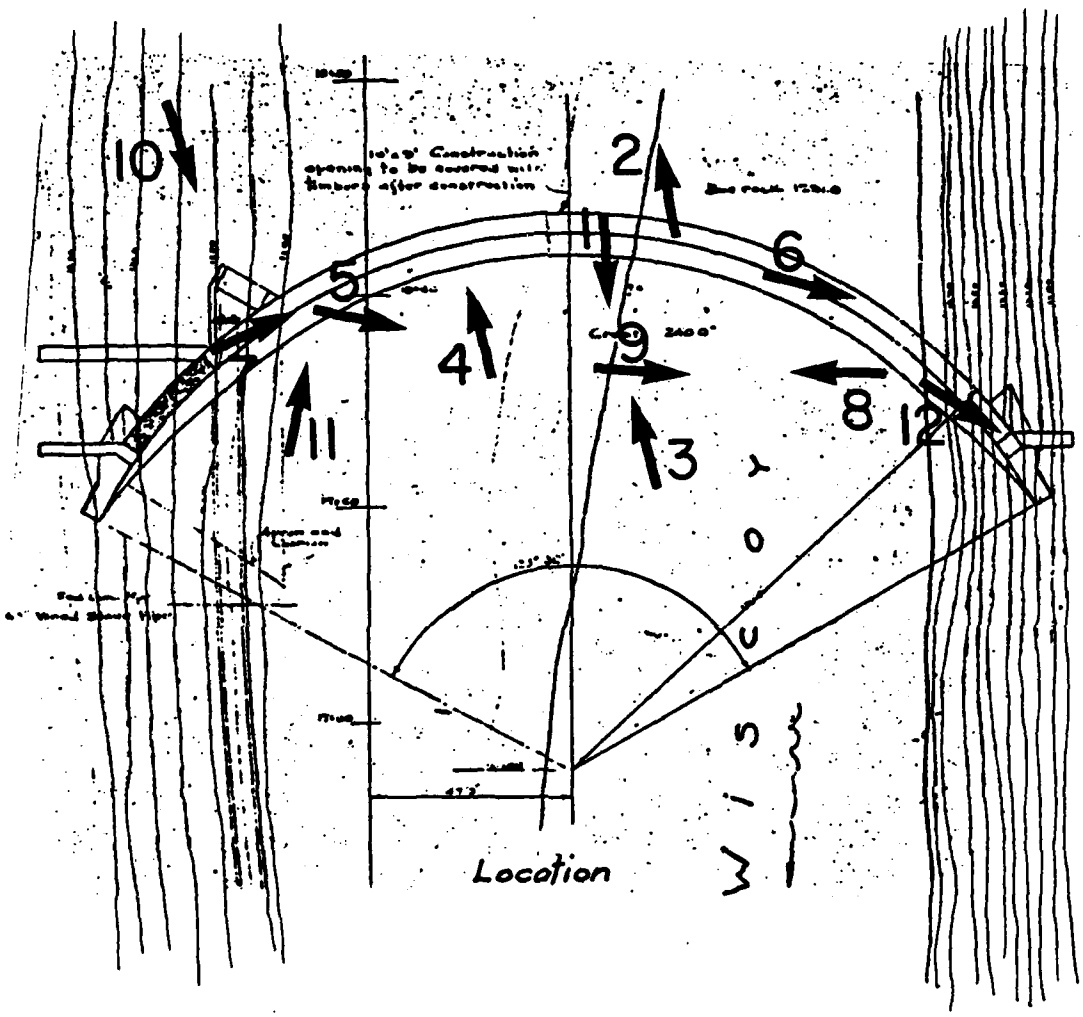
Elev. North Abutment

WISCOY ARCH DAM
for
FILLMORE-ELECTRIC-COMPANY
Fillmore, N. Y.
Gannett, Seelye & Fleming Engrs.
Erie, Pa & Hoq. Pa Memphis Tenn
June 9, 1921

B-3

APPENDIX C

PHOTOGRAPHS



WISCOY DAM

NY00461

PHOTO ORIENTATION PLAN

ERDMAN, ANTHONY, ASSOCIATES CONSULTING ENGINEERS & PLANNERS	DATE MAY 1981	

1. Downstream channel

2. Dam impoundment

3. Downstream face of dam. Note cracks, leaks, and effervesce

4. Leaking cracks in downstream face of dam.

5. Crest of dam at north abutment

6. Spillway in crest of dam near north abutment. Note spalled and cracked concrete.

7. Crack in crest of dam north of intake structure

8. Downstream face of dam at south abutment. Note cracked and spalled concrete, leaks, and effervesce.

9. North abutment. Note spalled concrete.

10. Intake structure for penstock leading to the powerhouse.

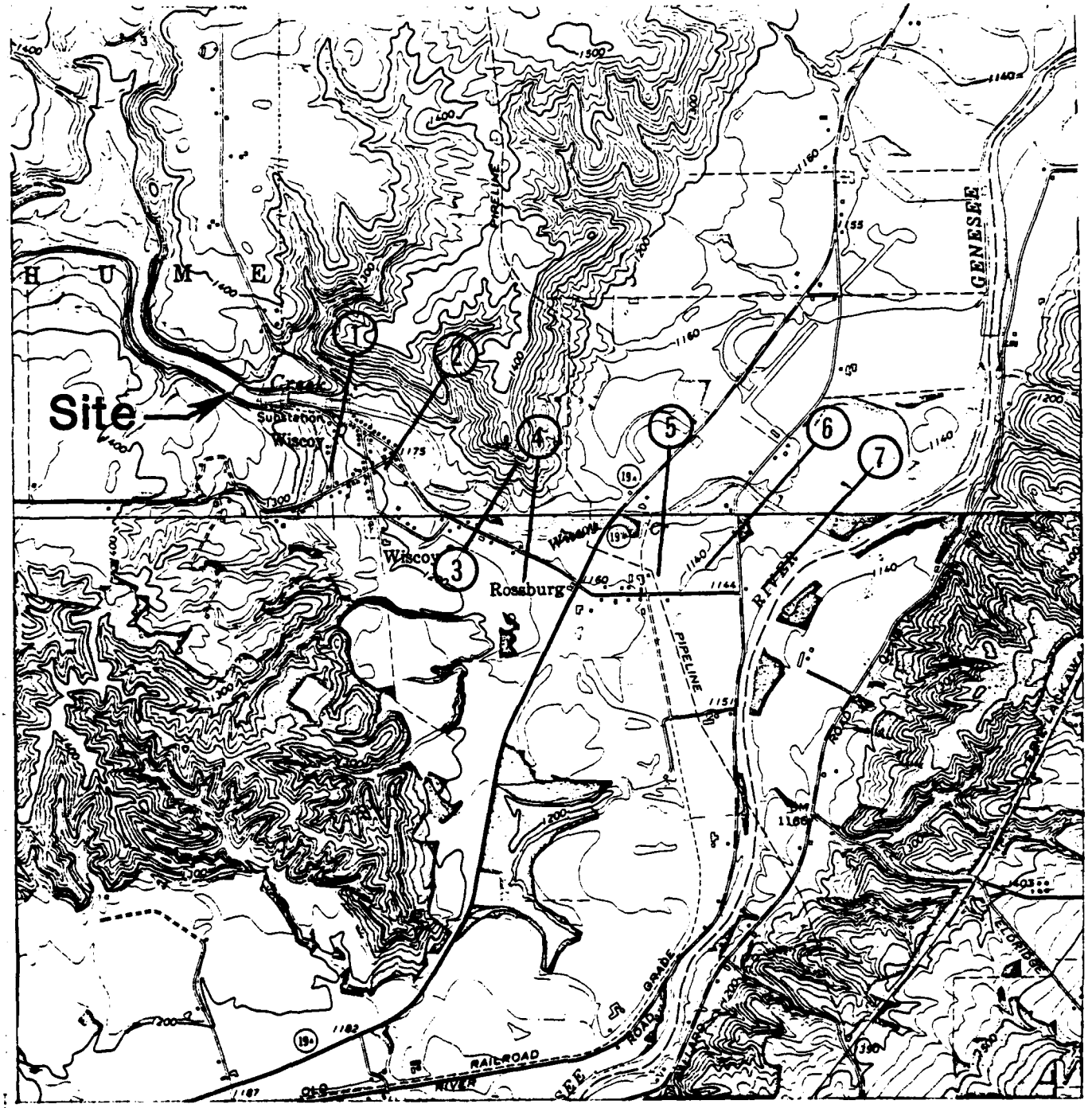
11. Inoperative sluice gate used to drain reservoir

12. Crest of dam at north abutment

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

APPENDIX D



Wiscoy Dam

CROSS SECTION LOCATION PLAN

Scale: 1" = 2000'

```
A1       ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF                DAM NY 461
A2       HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFTEY OF WISCOY DAM
A3       RATIOS OF PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM
B    100        0       30                                    0       -1        4
B1     5
J      1        6        1
J1   0.2      0.4      0.5      0.6      0.8      1.0
K      0  INFLOW                          0        0        1
K1       CALCULATION OF INFLOW HYDROGRAPH TO RESERVOIR
M      1        0   115.0                115.0        0                        1
P      0     22.2       86       96      107      117
T                                                   1.0      0.1                0
V    6.2      4.3        0
X    2.0     -.10      2.0
K      1 OUTFLOW                                                1
K1       CALCULATION OF OUTFLOW HYDROGRAPH FROM RESERVOIR
Y                                    1        1
Y1     1                                                -1263.4       -1
Y4 1234.0   1240.0   1245.0   1250.0   1255.0   1260.0   1263.4   1264.0   1266.0   1268.0
Y4 1270.0   1272.0   1274.0   1276.0   1278.0   1280.0
Y5     0.     109.     170.     214.     250.     282.     302.     365.     809.    1472.
Y5  2296.    3253.    4326.    5505.    6780.    8144.
SA     0       15       16       17       18       19       20       22       23       24
SA    25
SE 1234.0   1264.0   1264.3   1264.7   1265.4   1266.3   1267.7   1271.5   1274.0   1278.4
SE 1285.0
SS 1263.4
SD  1264
SL   160      203    225.5      240    280.7
SV 1264.0   1264.6   1269.5   1270.0   1300.0
K      1        1                                        1
K1     CHANNEL ROUTING -MOD PULS RESERVOIR - 1
Y                                    1        1
Y1     1
Y6  0.06     0.04     0.06     1178     1240     1800   0.0294
Y7     0     1240      100     1200      425     1181      450     1178      550     1178
Y7   675     1200      980     1220     1500     1240
K      1        2                                        1
K1     CHANNEL ROUTING -MOD PULS REACH 1-2
Y                                    1        1
Y1     1
Y6  0.06     0.04     0.06     1169     1200     1050   0.0086
Y7     0     1200      100     1173      130     1169      175     1169      180     1173
Y7   810     1180     1000     1200     1001     1200
K      1        3                                        1
K1     CHANNEL ROUTING -MOD PULS REACH 2-3
Y                                    1        1
Y1     1
Y6  0.06     0.04     0.06     1153     1180     1800   0.0089
Y7     0     1180      140     1157      155     1153      200     1153      230     1157
Y7  1100     1180     1101     1180     1102     1180
K      1        4                                        1
K1     CHANNEL ROUTING -MOD PULS REACH 3-4
Y                                    1        1
Y1     1
Y6  0.06     0.04     0.06     1148     1180      900   0.0056
Y7     0     1180      455     1152      475     1148      568     1148      588     1152
```

```
Y7  1460    1180    1401    1180    1402    1180
K      1       5                               1
K1    CHANNEL ROUTING -MOD PULS REACH 4-5
Y                                 1       1
Y1     1
Y6  0.06    0.04    0.06    1138    1155    1800  0.0056
Y7     0    1152     350    1142     430    1138     523    1138     580    1142
Y7  1480    1155    1401    1155    1402    1155
K      1       6                               1
K1    CHANNEL ROUTING -MOD PULS REACH 5-6
Y                                 1       1
Y1     1
Y6  0.06    0.04    0.06    1135    1152    1640  0.0018
Y7     0    1140     350    1141    1641    1140    1661    1135    1718    1135
Y7  1738    1140    3699    1141    3700    1152
K      1       7                               1
K1    CHANNEL ROUTING -MOD PULS REACH 6-7
Y                                 1       1
Y1     1
Y6  0.06    0.04    0.06    1132    1145     800  0.0036
Y7     0    1145     700    1141     801    1136     821    1132     878    1132
Y7   898    1136    3999    1145    4000    1145
K     99
```

```
OK, SEG #HEC1DB

OK, SEG #HEC1DB
ENTER PROJECT NUMBER
80166-00.01
INPUT FILE ? NY461
1*********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 *********************************
1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
                                   RUNOFF HYDROGRAPH AT       INFLOW
                                   ROUTE HYDROGRAPH TO        OUTFLOW
                                   ROUTE HYDROGRAPH TO             1
                                   ROUTE HYDROGRAPH TO             2
                                   ROUTE HYDROGRAPH TO             3
                                   ROUTE HYDROGRAPH TO             4
                                   ROUTE HYDROGRAPH TO             5
                                   ROUTE HYDROGRAPH TO             6
                                   ROUTE HYDROGRAPH TO             7
                                   END OF NETWORK

1*********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 *********************************

 RUN  DATE: 8/12/
      TIME: 7:56 AM

                    ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF                DAM NY 461
                    HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFTEY OF WISCOY DAM
                    RATIOS OF PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM

                                        JOB SPECIFICATION
          NQ      NHR      NMIN     IDAY      IHR      IMIN     METRC     IPLT     IPRT     NSTAN
         100        0        30        0        0         0         0       -1        4         0
                                    JOPER      NWT    LROPT    TRACE
                                        5        0        0        0


                                MULTI-PLAN ANALYSES TO BE PERFORMED
                                    NPLAN= 1 NRTIO= 6 LRTIO= 1
                      RTIOS=    0.20    0.40    0.50    0.60    0.80    1.00

**********          **********          **********          **********          **********

                                    SUB-AREA RUNOFF COMPUTATION

                        CALCULATION OF INFLOW HYDROGRAPH TO RESERVOIR
                                ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                               INFLOW        0        0        0        0        0        1        0        0

                                    HYDROGRAPH DATA
```

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	115.00	0.00	115.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.20	86.00	96.00	107.00	117.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.870

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 6.20 R= 4.30 NTA= 0

RECESSION DATA

STRTQ= 2.00 QRCSN= -0.10 RTIOR= 2.00

UNIT HYDROGRAPH 53 END-OF-PERIOD ORDINATES, LAG= 5.47 HOURS, CP= 0.68 VOL= 1.00

264.	982.	1982.	3129.	4365.	5653.	6919.	7593.	8772.	9263.
9463.	9338.	8749.	7855.	6991.	6223.	5539.	4931.	4389.	3906.
3477.	3095.	2755.	2452.	2183.	1943.	1729.	1539.	1370.	1220.
1086.	966.	860.	766.	681.	607.	540.	481.	428.	381.
339.	302.	269.	239.	213.	189.	169.	150.	134.	119.
106.	94.	84.							

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	22.60	18.84	3.77	2300372.
										(574.)	(478.)	(96.)	(65139.22)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CALCULATION OF OUTFLOW HYDROGRAPH FROM RESERVOIR

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	OUTFLOW	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1263.	-1

STAGE	1234.00	1240.00	1245.00	1250.00	1255.00	1260.00	1263.40	1264.00	1266.00	1268.00
	1270.00	1272.00	1274.00	1276.00	1278.00	1280.00				
FLOW	0.00	109.00	170.00	214.00	250.00	282.00	302.00	365.00	809.00	1472.00
	2296.00	3253.00	4326.00	5505.00	6780.00	8144.00				
SURFACE AREA=	0.	15.	16.	17.	18.	19.	20.	22.	23.	24.
	25.									

CAPACITY=	0.	150.	155.	161.	173.	190.	217.	297.	353.	457.
	619.									
ELEVATION=	1234.	1264.	1264.	1265.	1265.	1266.	1268.	1272.	1274.	1278.
	1285.									

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXFL
1263.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1264.0	0.0	0.0	0.

CREST LENGTH AT OR BELOW ELEVATION	168. 1264.0	283. 1264.6	226. 1269.5	240. 1270.0	281. 1300.0

PEAK OUTFLOW IS 27344. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 54680. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 68345. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 82012. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 109340. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 136670. AT TIME 45.00 HOURS

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS RESERVOIR - 1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0400	0.0600	1178.6	1240.0	1800.	0.02940

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 1240.00 100.00 1200.00 425.00 1181.00 450.00 1178.00 550.00 1178.00
675.00 1200.00 980.00 1220.00 1500.00 1240.00

STORAGE	0.00	16.58	41.55	76.55	121.57	176.62	241.69	316.72	400.16	491.42
	590.48	697.35	812.03	934.56	1067.83	1213.64	1371.99	1542.88	1726.30	1923.26
OUTFLOW	0.00	5061.93	18604.13	41131.09	73875.05	118085.52	174987.94	249389.69	349413.63	465514.94
	598222.00	748034.88	915459.25	1100432.00	1301394.75	1523975.75	1769194.50	2038125.25	2331845.50	2651418.50
STAGE	1178.00	1181.26	1184.53	1187.79	1191.05	1194.31	1197.58	1200.84	1204.10	1207.37
	1210.63	1213.89	1217.16	1220.42	1223.68	1226.94	1230.21	1233.47	1236.73	1240.00
FLOW	0.00	5061.93	18604.13	41131.09	73875.05	118085.52	174987.94	249389.69	349413.63	465514.94
	598222.00	748034.88	915459.25	1100432.00	1301394.75	1523975.75	1769194.50	2038125.25	2331845.50	2651418.50

MAXIMUM STAGE IS 1185.8

MAXIMUM STAGE IS 1189.1

MAXIMUM STAGE IS 1190.5

MAXIMUM STAGE IS 1191.7

MAXIMUM STAGE IS 1193.7

MAXIMUM STAGE IS 1195.4

D-8

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 1-2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPPP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0400	0.0600	1169.0	1200.0	1050.	0.00860

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1200.00 100.00 1173.00 130.00 1169.00 175.00 1169.00 180.00 1173.00
810.00 1186.00 1000.00 1200.00 1001.00 1200.00

STORAGE	0.00	2.05	4.66	8.65	18.10	33.56	55.02	82.33	111.91	143.34
	173.61	205.73	238.70	272.52	307.18	342.68	375.05	416.25	454.30	493.20

OUTFLOW	0.00	371.28	1243.09	1896.65	4299.10	9391.11	17893.30	31405.88	51893.42	76529.30
	105095.84	137439.72	173448.38	213036.41	256138.78	302704.13	352692.88	406873.81	462822.94	522921.81
STAGE	1169.00	1170.63	1172.26	1173.89	1175.53	1177.16	1178.79	1180.42	1182.05	1183.68
	1185.31	1186.94	1188.58	1190.21	1191.84	1193.47	1195.10	1196.73	1198.36	1200.00
FLOW	0.00	371.28	1243.09	1896.65	4299.10	9391.11	17893.30	31405.88	51893.42	76529.30
	105095.84	137439.72	173448.38	213036.41	256138.78	302704.13	352692.88	406873.81	462822.94	522921.81

MAXIMUM STAGE IS 1179.9

MAXIMUM STAGE IS 1182.2

MAXIMUM STAGE IS 1183.1

MAXIMUM STAGE IS 1184.0

MAXIMUM STAGE IS 1185.5

MAXIMUM STAGE IS 1186.9

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 2-3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0400	0.0600	1153.0	1180.0	1800.	0.00890

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1180.00 140.00 1157.00 155.00 1153.00 200.00 1153.00 230.00 1157.00
1100.00 1180.00 1101.00 1180.00 1102.00 1180.00

STORAGE	0.00	3.11	7.16	12.20	19.99	31.45	46.57	65.35	87.88	113.91
	143.69	177.12	214.23	254.99	299.42	347.51	399.27	454.69	513.77	576.52
OUTFLOW	0.00	303.57	1034.16	2061.28	3356.86	5726.73	9344.45	14413.13	21132.09	29692.10
	40275.61	53057.52	68206.17	85884.19	106249.03	129453.75	155647.41	184975.13	217578.91	253597.94
STAGE	1153.00	1154.42	1155.84	1157.26	1158.68	1160.10	1161.53	1162.95	1164.37	1165.79

	1167.21	1168.63	1170.05	1171.47	1172.89	1174.31	1175.73	1177.16	1178.58	1180.00
FLOW	0.00	383.57	1834.16	2861.28	3356.86	5726.73	9344.45	14413.13	21132.89	29692.10
	40275.61	53857.52	68206.17	85884.19	106249.03	129453.75	155647.41	184975.13	217578.91	253591.94

MAXIMUM STAGE IS 1165.4

MAXIMUM STAGE IS 1168.8

MAXIMUM STAGE IS 1170.1

MAXIMUM STAGE IS 1171.2

MAXIMUM STAGE IS 1173.1

MAXIMUM STAGE IS 1174.7

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 3-4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0400	0.0600	1148.0	1180.0	900.	0.00560

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1180.00 455.00 1152.00 475.00 1148.00 568.00 1148.00 588.00 1152.00
1488.00 1180.00 1401.00 1180.00 1402.00 1180.00

STORAGE	0.00	3.53	7.64	12.75	20.36	30.62	42.53	59.10	77.31	98.18
	121.70	147.87	176.70	208.17	242.30	279.07	318.50	360.58	405.31	452.70
OUTFLOW	0.00	638.86	2098.35	3910.19	6637.55	10803.10	16658.28	24444.57	34391.38	46716.98
	61630.34	79332.56	100017.48	123872.84	151080.94	181819.09	216260.50	254574.00	296925.19	343476.00
STAGE	1148.00	1149.68	1151.37	1153.05	1154.74	1156.42	1158.10	1159.79	1161.47	1163.16
	1164.84	1166.52	1168.21	1169.89	1171.58	1173.26	1174.95	1176.63	1178.31	1180.00
FLOW	0.00	638.86	2098.35	3910.19	6637.55	10803.10	16658.28	24444.57	34391.38	46716.98
	61630.34	79332.56	100017.48	123872.84	151080.94	181819.09	216260.50	254574.00	296925.19	343476.00

MAXIMUM STAGE IS 1160.3

MAXIMUM STAGE IS 1164.1

MAXIMUM STAGE IS 1165.5

MAXIMUM STAGE IS 1166.8

MAXIMUM STAGE IS 1168.9

MAXIMUM STAGE IS 1170.7

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 4-5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0
	NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0400	0.0600	1138.0	1155.0	1800.	0.00560

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1152.00 350.00 1142.00 430.00 1138.00 523.00 1138.00 580.00 1142.00
1400.00 1155.00 1401.00 1155.00 1402.00 1155.00

STORAGE	0.00	4.00	9.14	15.41	22.81	31.64	42.48	58.56	76.88	98.44
	123.25	151.30	182.60	217.14	254.92	295.94	340.14	386.66	435.27	485.97
OUTFLOW	0.00	229.35	775.33	1620.27	2776.97	3978.64	5505.65	7732.78	10719.16	14551.88
	19311.30	25083.04	31946.31	39979.17	49257.39	59854.76	72133.95	86400.41	102147.13	119405.63
STAGE	1138.00	1138.89	1139.79	1140.68	1141.58	1142.47	1143.37	1144.26	1145.16	1146.05
	1146.95	1147.84	1148.73	1149.63	1150.52	1151.42	1152.31	1153.21	1154.10	1155.00
FLOW	0.00	229.35	775.33	1620.27	2776.97	3978.64	5505.65	7732.78	10719.16	14551.88
	19311.30	25083.04	31946.31	39979.17	49257.39	59854.76	72133.95	86400.41	102147.13	119405.63

MAXIMUM STAGE IS 1146.1

MAXIMUM STAGE IS 1151.0

MAXIMUM STAGE IS 1152.0

MAXIMUM STAGE IS 1152.9

MAXIMUM STAGE IS 1154.5

MAXIMUM STAGE IS 1155.9

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 5-6

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0400	0.0600	1135.0	1152.0	1640.	0.00180

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 1148.00 350.00 1141.00 1641.00 1140.00 1661.00 1135.00 1718.00 1135.00
1738.00 1140.00 3699.00 1141.00 3700.00 1152.00

STORAGE	0.00	2.04	4.32	6.84	9.61	12.61	24.89	112.43	226.41	341.91
	458.91	577.42	697.44	818.97	942.81	1066.48	1191.00	1315.60	1440.21	1564.82
OUTFLOW	0.00	76.35	248.11	500.13	829.40	1236.02	1827.45	4569.48	11048.72	18231.06
	31769.63	45462.81	61174.78	78806.64	98283.00	119894.17	143664.38	169142.22	196270.78	224995.72
STAGE	1135.00	1135.89	1136.79	1137.68	1138.58	1139.47	1140.37	1141.26	1142.16	1143.05
	1143.95	1144.84	1145.73	1146.63	1147.52	1148.42	1149.31	1150.21	1151.10	1152.00
FLOW	0.00	76.35	248.11	500.13	829.40	1236.02	1827.45	4569.48	11048.72	18231.06
	31769.63	45462.81	61174.78	78806.64	98283.00	119894.17	143664.38	169142.22	196270.78	224995.72

MAXIMUM STAGE IS 1143.6

MAXIMUM STAGE IS 1145.4

MAXIMUM STAGE IS 1146.1

MAXIMUM STAGE IS 1146.8

MAXIMUM STAGE IS 1148.8

MAXIMUM STAGE IS 1149.1

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 6-7

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
7	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0400	0.0600	1132.0	1145.0	800.	0.00360

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1145.00 700.00 1141.00 801.00 1136.00 821.00 1132.00 878.00 1132.00
898.00 1136.00 3999.00 1145.00 4000.00 1145.00

STORAGE	0.00	0.76	1.60	2.54	3.55	4.65	5.88	9.14	15.54	25.88
	37.75	53.55	72.49	94.57	120.25	150.38	184.98	224.04	267.57	315.56
OUTFLOW	0.00	69.04	224.23	451.65	748.36	1114.22	1561.51	2231.54	3271.73	4838.11
	7061.89	10060.72	13943.07	18810.67	24549.66	31685.15	40303.66	50521.36	62464.68	76258.53
STAGE	1132.00	1132.68	1133.37	1134.05	1134.74	1135.42	1136.10	1136.79	1137.47	1138.16
	1138.84	1139.52	1140.21	1140.89	1141.58	1142.26	1142.95	1143.63	1144.31	1145.00
FLOW	0.00	69.04	224.23	451.65	748.36	1114.22	1561.51	2231.54	3271.73	4838.11
	7061.89	10060.72	13943.07	18810.67	24549.66	31685.15	40303.66	50521.36	62464.68	76258.53

MAXIMUM STAGE IS 1141.8

MAXIMUM STAGE IS 1143.9

MAXIMUM STAGE IS 1144.6

MAXIMUM STAGE IS 1145.3

MAXIMUM STAGE IS 1146.6

MAXIMUM STAGE IS 1148.0

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1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 0.20	RATIO 2 0.40	RATIO 3 0.50	RATIO 4 0.60	RATIO 5 0.80	RATIO 6 1.00
HYDROGRAPH AT	INFLOW	115.00	1	27354.	54708.	68385.	82063.	109417.	136771.
		(297.85)		(774.58)(	1549.17)(	1936.46)(	2323.75)(	3098.33)(	3872.92)(
ROUTED TO	OUTFLOW	115.00	1	27344.	54680.	68345.	82012.	109340.	136670.
		(297.85)		(774.30)(	1548.35)(	1935.32)(	2322.31)(	3096.17)(	3870.07)(
ROUTED TO	1	115.00	1	27351.	54716.	68364.	82043.	109368.	136711.
		(297.85)		(774.48)(	1549.39)(	1935.85)(	2323.20)(	3096.96)(	3871.21)(
ROUTED TO	2	115.00	1	27363.	54730.	68379.	82073.	109353.	136810.
		(297.85)		(774.83)(	1549.77)(	1936.29)(	2324.05)(	3096.54)(	3874.03)(
ROUTED TO	3	115.00	1	27389.	54731.	68441.	82076.	109457.	136794.
		(297.85)		(775.56)(	1549.80)(	1938.03)(	2324.13)(	3099.47)(	3873.58)(
ROUTED TO	4	115.00	1	27378.	54724.	68459.	82120.	109515.	136819.
		(297.85)		(775.26)(	1549.61)(	1938.55)(	2325.38)(	3101.11)(	3874.28)(
ROUTED TO	5	115.00	1	27398.	54772.	68476.	82175.	109540.	136899.
		(297.85)		(775.83)(	1550.96)(	1939.01)(	2326.93)(	3101.83)(	3876.56)(
ROUTED TO	6	115.00	1	27370.	54783.	68488.	82171.	109596.	136982.
		(297.85)		(775.04)(	1551.28)(	1939.35)(	2326.81)(	3103.40)(	3878.89)(
ROUTED TO	7	115.00	1	27357.	54808.	68450.	82180.	109560.	136973.
		(297.85)		(774.65)(	1551.98)(	1938.28)(	2327.07)(	3102.39)(	3878.65)(

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1263.40	1263.40	1264.00
STORAGE	141.	141.	150.
OUTFLOW	302.	302.	365.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	1274.41	10.41	363.	27344.	29.00	45.00	0.00
0.40	1280.28	16.28	502.	54680.	31.00	45.00	0.00

OK, SEG #HEC1DB

0.50	1282.81	18.81	564.	68345.	31.00	45.00	0.00
0.60	1285.18	21.18	623.	82012.	31.50	45.00	0.00
0.80	1289.55	25.55	734.	109340.	32.00	45.00	0.00
1.00	1293.55	29.55	838.	136670.	32.00	45.00	0.00

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	27351.	1185.8	45.00
0.40	54716.	1189.1	45.00
0.50	68364.	1190.5	45.00
0.60	82043.	1191.7	45.00
0.80	109368.	1193.7	45.00
1.00	136711.	1195.4	45.00

PLAN 1 STATION 2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	27363.	1179.9	45.00
0.40	54730.	1182.2	45.00
0.50	68379.	1183.1	45.00
0.60	82073.	1184.0	45.00
0.80	109353.	1185.5	45.00
1.00	136810.	1186.9	45.00

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	27389.	1165.4	45.00
0.40	54731.	1168.8	45.00
0.50	68441.	1170.1	45.00
0.60	82076.	1171.2	45.00
0.80	109457.	1173.1	45.00
1.00	136794.	1174.7	45.00

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	27378.	1160.3	45.00
0.40	54724.	1164.1	45.00
0.50	68459.	1165.5	45.00
0.60	82120.	1166.8	45.00
0.80	109515.	1168.9	45.00
1.00	136819.	1170.7	45.00

PLAN 1 STATION 5

RATIO	MAXIMUM	MAXIMUM	TIME

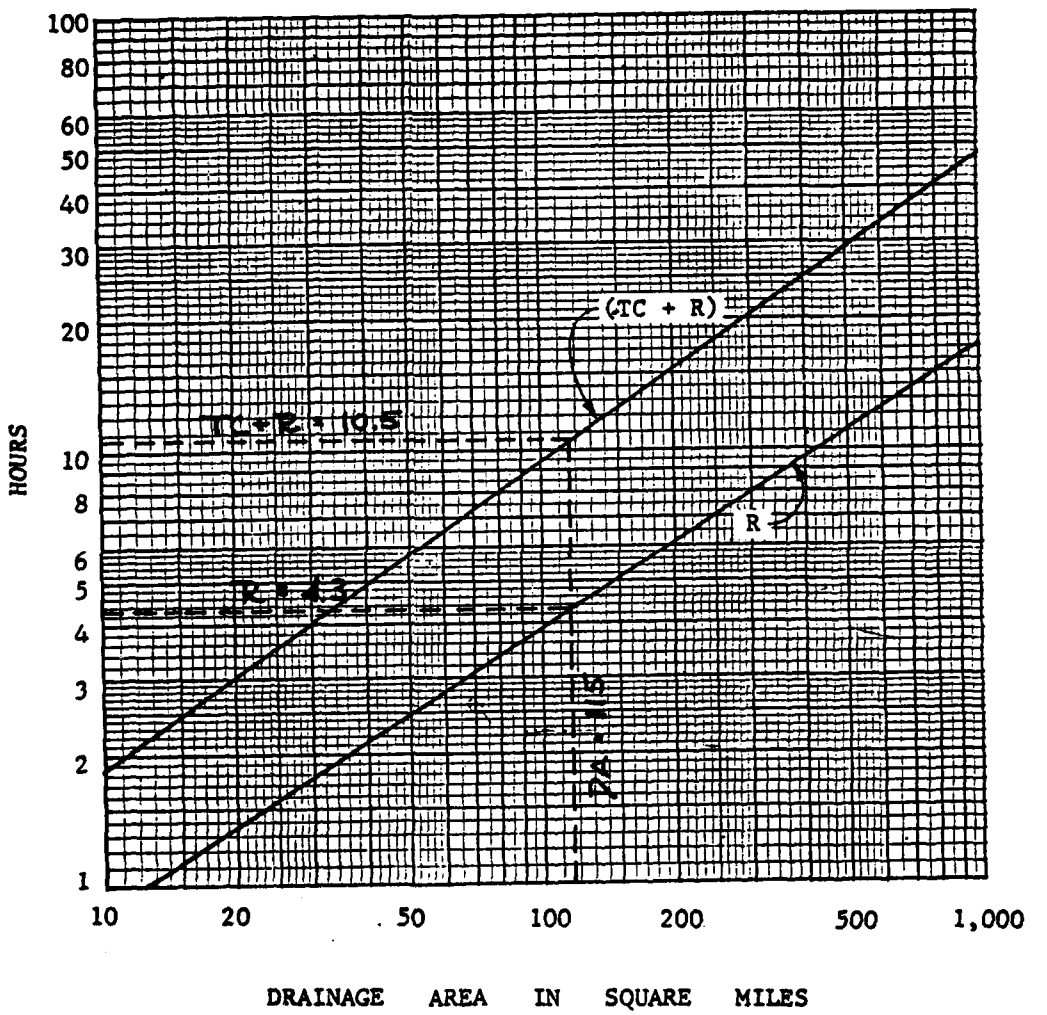
RATIO	FLOW,CFS	STAGE,FT	HOURS
0.20	27398.	1148.1	45.00
0.40	54772.	1151.0	45.00
0.50	68476.	1152.0	45.00
0.60	82175.	1152.9	45.00
0.80	109548.	1154.5	45.00
1.00	136899.	1155.9	45.00

PLAN 1 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	27378.	1143.6	45.00
0.40	54783.	1145.4	45.00
0.50	68488.	1146.1	45.00
0.60	82171.	1146.8	45.00
0.80	109596.	1148.0	45.00
1.00	136982.	1149.1	45.00

PLAN 1 STATION 7

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	27357.	1141.8	45.00
0.40	54808.	1143.9	45.00
0.50	68450.	1144.6	45.00
0.60	82180.	1145.3	45.00
0.80	109560.	1146.6	45.00
1.00	136973.	1148.0	45.00



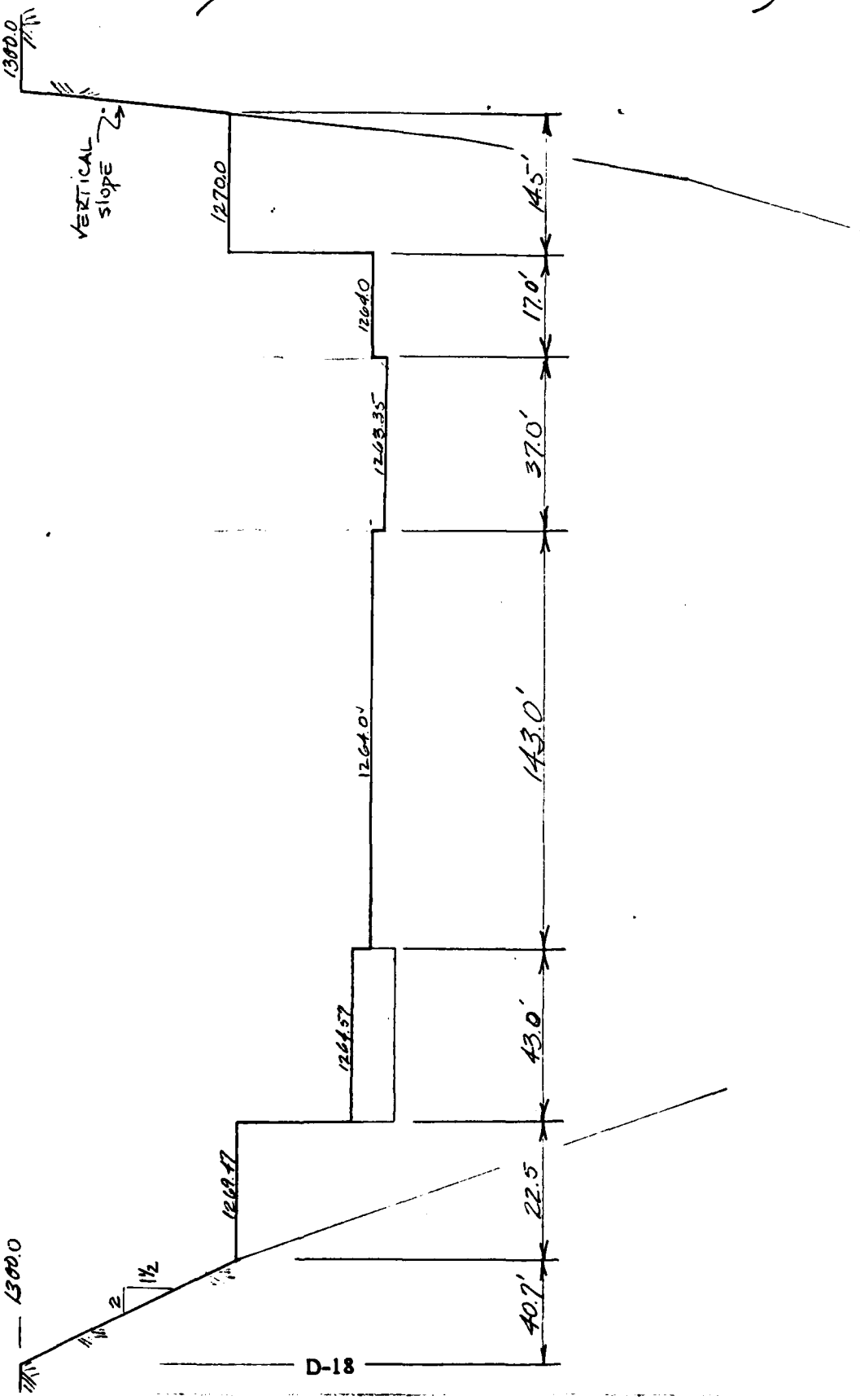
GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA

CLARK'S COEFFICIENTS VERSUS DRAINAGE AREA

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1967

FIGURE E6A

Wiscoy Dam (looking upstream)



Service Spillway (Wooden Pen Stock)

Pipeline length ≅ 1500' ; Pipeline DIA. = 5'

Substation elevation ≅ 1200, say pipe outlet elev. ≅ 1190

Assume that the 5' dia. pipe is the control & develop an eqtn. of the form $Q = CA\sqrt{2gh}$ to describe the flow.

$$C = \left(1 + 0.31 d^{0.5} + \frac{0.026 L}{d^{1.2}}\right)^{-1/2}$$ from Brater & King, pg. 4-24 Conc. Pipe, square-cornered entr.

$$C = \left(1 + 0.31(5)^{0.5} + \frac{0.026(1500)}{(5.)^{1.2}}\right)^{-1/2} = 0.369 \checkmark$$

$$Q = C_o A_o \sqrt{2gh} = (0.37)(19.6^{\#})\sqrt{2(32.2)h_o}$$

$$Q = 58.20\, h_o^{0.5} \quad \checkmark$$

Elev.	h_o	Q_s
1240.0	3.5	109
1245.0	8.5	170
1250.0	13.5	214
1255.0	18.5	250
1260.0	23.5	282
1263.0	26.5	300
1264.0	27.5	305
1266.0	29.5	316
1268.0	31.5	327
1270.0	33.5	337
1272.0	35.5	347
1274.0	37.5	356
1276.0	39.5	366
1278.0	41.5	375
1280.0	43.5	384

Elev.	h_o	Q_s
1263.35	26.85	302
1264.57	28.07	308
1269.47	32.97	334

BY RLS DATE 6-29-81 ERDMAN, ANTHONY, ASSOCIATES SHEET 4 OF 9
CKD DATE SUBJECT DAM 461 - Hydraulics SUB-SHEET NO. 3
OWNER PROJECT NAME DAM INSPECTION (80166-00.01)

Service Spillway

The upstream opening of the penstock has an operable gate as shown in the plans but also has a triangular metal riser shaft attached to the dam. The hydraulic analysis was done with the water surface beginning at the midpoint of the gate opening with the gate wide open.

DATE 7/27/81 ERDMAN, ANTHONY, ASSOCIATES SHEET 5 OF 9

CKD BR DATE 6-10-81 SUBJECT DPH 461 - Hydraulics SUB-SHEET NO. 4

OWNER PROJECT NAME DPH Inspections (80166-00.01)

Emergency Spillway

Ref: Brater & King pg. 5-23 "Broad Crested Weir"

$Q = 3.087 L H^{3/2}$

$L = 37.0'$ (measured during field insp., May 20, 1981)

Spillway elevation = 1263.35

$Q = 114.22 H^{1.5}$

Elev	H	Q_E
1263.35	0	0
1264.00	0.65	60
1264.57	1.22	154
1266.00	2.65	493
1268.00	4.65	1145
1269.47	6.12	1729
1270.00	6.65	1959
1272.00	8.65	2906
1274.00	10.65	3970
1276.00	12.65	5139
1278.00	14.65	6405
1280.00	16.65	7760

Note: The surface areas shown were obtained from the original design calculations

BY [illegible] DATE 5/27/81 ERDMAN, ANTHONY, ASSOCIATES SHEET 6 OF 9

CKD BR DATE 6-10-81 SUBJECT Dam 41 - Hydraulics SUB-SHEET NO. 5

OWNER PROJECT NAME Dam Inspections (80166-03.01)

Stage - Discharge / Storage Relationship

Elev.	$Q_S + Q_E$	Surface Area (Acres)
1234.0	0	0
1240.0	109	—
1245.0	170	—
1250.0	214	—
1255.0	250	—
1260.0	282	—
1263.4	302 365	—
1264.0	~~342~~	15
1264.3	—	16
1264.6	462	—
1264.7	—	17
1265.4	—	18
1266.0	809	—
1266.3	—	19
1267.7	—	20
1268.0	1472	—
1269.5	2063	—
1270.0	2296	—
1271.5	—	22
1272.0	3253	
1274.0	4326	23
1276.0	5305	—
1276.0	6780	—
1278.4	—	24
1280.0	8144	—
1284.0	—	25

WISCOY DAM

note: SOME ADJUSTMENTS ARE MADE ON COMPUTER INPUT SHEET

DAM DATA

DAM TOP ELEV. 1264.0 REFF. PLAN 30D 565, NY461
DAM INV. ELEV. 1231.0 "

REACH 1 LENGTH = 1800'

CROSS SECT.	1240	1200	1160	1176	1178	1200	1220	1240
	0	100	425	450	550	675	980	1500

SLOPE: DAM INV. - RE. 1 INV = h ÷ L = SLOPE
1231.0 − 1178 = 53' ÷ 1600' = 0.0294 ✓

REACH 2 LENGTH = 1050'

CROSS SECT.	1200	1180	1169	1169	1175	1180	1200
	0	75	110	190	700	810	1000

✓

SLOPE: RE. 1 INV - RE. 2 INV = h ÷ L = SLOPE
1178 - 1169 = 9' ÷ 1050' = 0.0036

REACH 3 LENGTH = 1800'

CROSS SECT.	1180	1160	1153	1153	1160	1180
	0	100	150	200	610	1100

✓

SLOPE: RE. 2 INV. - RE. 3 INV. = h ÷ L = SLOPE
1169 − 1153 = 16' ÷ 1800' = 0.0089

REACH 4 LENGTH = 900'

CROSS SECT.	1180	1160	1148	1148	1160	1180
	0	130	490	550	790	1400

✓

SLOPE: RE. 3 INV. − RE. 4 INV. = h ÷ L = SLOPE
1153 - 1148 = 5' ÷ 900' = 0.0056

WISCOY DAM

REACH 5 LENGTH = 1800'

CROSS SECT.	1148	1140	1138	1138	1140	1155
	0	350	460	490	580	1400

SLOPE: RE. 4 INV. - RE. 5 INV. = h ÷ L = SLOPE
1148 - 1138 = 10' ÷ 1800' = 0.0056 ✓

REACH 6 LENGTH = 1640'

CROSS SECT.	1140	1135	1135	1140
	0	200	275	800

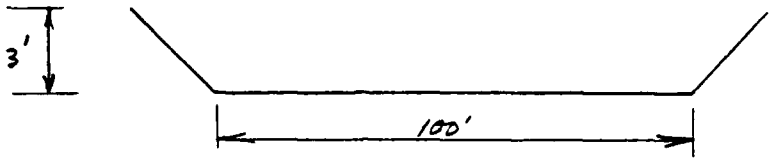
SLOPE: RE. 5 INV. - RE. 6 INV. = h ÷ L = SLOPE
1138 - 1135 = 3' ÷ 1640' = 0.0018 ✓

REACH 7 LENGTH = 800'

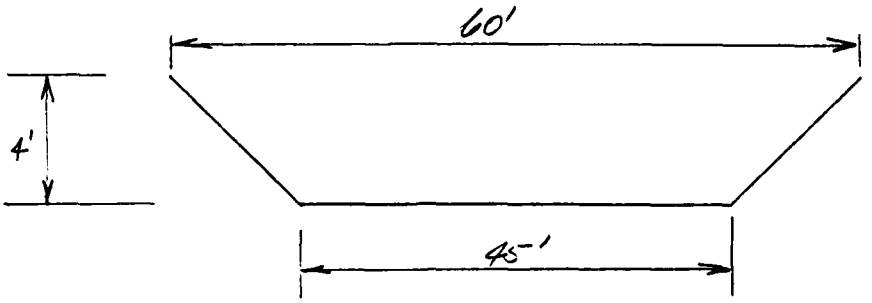
CROSS SECT.	1138	1141	1140	1132	1132	1140	1144
	0	700	780	800	900	1325	2270

SLOPE: RE. 6 INV. - RE. 7 INV. = h ÷ L = SLOPE
1135 - 1132 = 3' ÷ 800' = 0.0036 ✓

Section 1



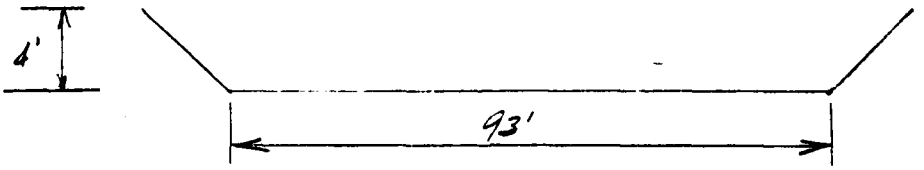
Section 2



Section 3

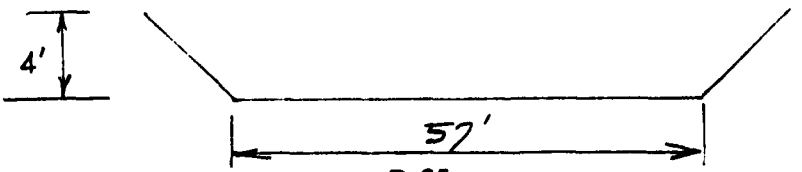
— SAME SECTION AS SECT. 2

Section 4



Section 5 — SAME AS SECT. 4

Section 6 & 7



CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DAM NY 461

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	1264.0	15.0	150
2) Design High Water (Max. Design Pool)	1278.4	24.0	251
3) Auxiliary Spillway Crest	1263.4	14.2	141
4) Pool Level with Flashboards	N/A	—	—
5) Service Spillway Crest	1261.5	11.6	113

DISCHARGES

	Volume (cfs)
1) Average Daily	unknown
2) Spillway @ Maximum High Water	334
3) Spillway @ Design High Water	377
4) Spillway @ Auxiliary Spillway Crest Elevation	302
5) Low Level Outlet	0
6) Total (of all facilities) @ Maximum High Water	9862
7) Maximum Known Flood (observed high water)	1000
8) At Time of Inspection	295

CREST: ELEVATION: 1264.0

Type: Broad Crested Weir

Width: 5 ft. Length 240± ft.

Spillover

Location South end of dam

SPILLWAY:

SERVICE		AUXILIARY
1261.5	Elevation	1263.4
Metal Riser & Wood Pipe	Type	Rectangular Section
60 in. diameter	Width	37 ft.
	Type of Control	
✓	Uncontrolled	✓
	Controlled:	
	Type (Flashboards; gate)	
	Number	
	Size/Length	
	Invert Material	
	Anticipated Length of operating service	
	Chute Length	
	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	

HYDROMETEROLOGICAL GAGES:

Type : NONE

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

_____

Method of Controlled Releases (mechanisms):

NONE

_____

DRAINAGE AREA: 115.0 sq. mi.

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Woodland, pastures and farmland

Terrain - Relief: hilly

Surface - Soil: Glacial till over shallow bedrock

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

None

Potential Sedimentation problem areas (natural or man-made; present or future)

None

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

None

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: None

Elevation:

Reservoir:

Length @ Maximum Pool ±0.7 (Miles)

Length of Shoreline (@ Spillway Crest) ±1.4 (Miles)

APPENDIX E

REFERENCES

APPENDIX E

REFERENCES

1) U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, May, 1961.

2) F.M. Henderson, Open Channel Flow, Macmillian Publishing Co., Inc., 1966.

3) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th Edition, McGraw-Hill, 1963.

4) T. W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley and Sons, 1969.

5) W.D. Thornbury, Principles of Geomorphology, John Wiley and Sons, 1969.

6) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.

7) Cornell University Agriculture Experiment Station (compiled by M.G. Cline and R.L. Marshall), General Soil Map of New York State and Soils of New York Landscapes , Information Bulletin 119, 1977.

8) U.S. Department of Commerce, Hydrometeorological Report No. 33, Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas From 10 to 1000 Square Miles and Durations of 6, 12, 24, and 48 hours, April 1956.

9) U.S. Department of the Army, Engineering Manual 1110-2-1411, Standard Project Flood Determinations, March 1952.

10) U.S. Army Corps of Engineers, The Hydrologic Engineering Center, Flood Hydrograph Package (HEC-1) Users Manual for Dam Safety Investigations, September, 1978.

APPENDIX F

STABILITY ANALYSIS

SANNETT, SEELYE & FLEMING, Inc.
ENGINEERS

SUBJECT [illegible] FILE NO.

SHEET NO. 1 OF 2 SHEETS

FOR Elmore Finch Co.

COMPUTED BY F.L.B DATE 6/7/31 CHECKED BY DATE

Dam Stresses

Summary.

Radius of Upstream Face 130'

Length of crest 250'

Max Height - top of footing to crest 33' 29.6 18.1

Top width 5'
Bottom width 10' Upstream face vertical

Condition of loading I

With a discharge of 40,000 c.f.s. or 400 c.f.s./ft. of spillway
depth over crest = 15'
Tail water = 15' to 18'

Max compressive stress computed by formula 3-p
at top = 170 #/sq.in. at base = 242 #/sq.in.

Thrust on abutment rock = 9.5 Tons per ft.

Condition of loading II

With a discharge of 17,250 c.f.s. or 173 c.f.s./ft. of spillway
depth over crest 8'
Tail water depth neglected

Max. stress at top of dam = 2 #/sq.in.
" " bottom " = 232 #/sq.in.
" thrust on abutment rock = 9.7 tons.

GANNETT, SEELYE & FLEMING, Inc.
ENGINEERS

SUBJECT ... FILE NO. ...

FOR Filmore Electric Co. SHEET NO. 7 OF 7 SHEETS

COMPUTED BY FLB DATE 6/7/21 CHECKED BY ... DATE ...

Max. H.W. 1279

15' over crest.

12 W.

T.W. El. 1246

Top Footing 1231

Cond. No. I

For 15' over crest. Flow 46,000 c.f.s.

15' Tail Water.

Crest 2004'

Radius of upstream face 150'

Stress at toe of dam

15' x 62.5 x 130 = 122,000 # dam 5' thick. f_c = 170 #/□"

Stress at Elev 1246 and below

33 x 62.5 x 130 = 268,000 # dam 7.7' thick f_c = 242 #/□"

Horiz thrust on abut rock at El. 1246

= 268,000 ÷ 14 = 19,000 #/' = 9.5 Tons/ft'

Cond. No. I

Max. 1272

Crest 1264

Footing 1231

For 8' over crest flow 150 c.f.s./ft.

= 17,250 c.f.s.

no. Tail water.

Stress at Top of dam

(illegible) x 62.5 x 130 = (illegible) = 9 #/□"

Stress at base El. 1231

41 x 62.5 x 130 = 333,000 #

= 232 #/□"

Horiz thrust at rock at El. 1234

32 x 62.5 x 130 = 310,000 # = 19,000 #/' = 9.7 Tons

(illegible)

(illegible) Radius (illegible) 120.00 OK

(illegible)

SUBJECT Proposed concrete arch dam; Fillmore Electric Co., owners — FILE — ACC. NO. 3503 — SHEET 1

COMPUTER [illegible] April 1921 CHECKED BY — 19

MADE IN CONNECTION WITH Dam Application No. 410

REFERENCE — Comp'd from Acc.

COMPLETE FILING SYMBOL

Papers:

1. Apr. 18, 1921, letter-report by Frank L. Bolton, as District Engineer representing Messrs Gannett, Seelye and Fleming, engineers for applicant;
2. Application, serial No. 410, dated Apr. 18, 1921;
3. Apr. 21, 1921, letter to applicant requesting that dam be designed with some factor of safety in case of a flood of about 46,000 c.f.s;
4. June 9, 1921, letter transmitting blue print, computation sheets and data sheet in re other arch dams; and 4 photographs of site;
5. June 18, 1921, report on inspection of site by Inspector of Docks and Dams;
6. June 22, 1921, letter transmitting specifications;
7. July 4, 1921, letter transmitting print of revised drawings;

Errors, Omissions or lack of Clearness:

(See over if any noted)

Site and General Description:

1900 ft. below junction of Wiscoy and East Kay creeks, town of Hume, Allegany Co., N.Y.

A flood about 14 years ago washed away dams and mills at Wiscoy (Ref. Paper #1, supra.)

July 9, 1902 article in Mt. Morris Enterprise (Steam Dec. 1902, Water Supply Comm Rept. p. 251) "At Wiscoy 3 Mills Mills, two grist mills, furniture factory, planing mill, saw mill, several residences and several barns [illegible]"

F.1

Proposed concrete arch dam;
Fillmore Electric Co., owners.

FILE NO. [illegible]
ACC. NO. 354

COMPUTER Just April 1921 CHECKED BY SHEET
MADE IN CONNECTION WITH App. Ser. #410 19
REFERENCE
COPIES FROM ACC. 350

Drainage Area:

Stated in Apr. 18, 1921 letter report by Frank L. Bolton, District Engineer for Gannett, Seelye & Flem Engineers for applicant, as 1.15 Square miles;

Stated in 1909 S.W.S. Commn. report, for mouth of creek, as 1.125 Square miles;

Stated in Rafters Hydrology for mouth of creek, as (942.2 - 833.6) = 108.6 Square miles;

Stated in State Conservation Commission 1908 report, p. 219, as 114 Square miles.

115 - Square miles, seems O.K.

Foundation in vicinity of Site

Described on p. 219 of 1908, State Water Supply Commission report as being narrow gorge with precip. sides of disintegrated slate

April 18 1921 engineers report, states same to be a good quality of shale. Layers vary from 1" to 1'11. in thickness.

No subsurface surveys made as yet.

Few minor seams in river bottom.

Mr. McKim reported foundation seemingly O.K. after inspection on June 17, 1921 (Test holes showed rock on South. Exposed [illegible]

COPIES ON ACC. [illegible]

Subject: Wiscoy K. above Wiscoy — File No. D... 656 — Acc. No. 3547 — Sheet 3

Computer: ... Apr 1921 Checked by: ...

Made in connection with: Dm Acc# 410

Reference — Cont'd from Acc. 3546

Maximum Flood

(received later, On print: El. 1...)

Elevation at base of proposed dam on U.S.G.S. = 122.. rises to 1520± on north and 1570± south.

Junction of East Kay and Wiscoy creeks, 1900 ft. above si..

Drainage area of both streams about same.

East Koy at north side of complete watershed is longer than Wiscoy and does not attain El. 2,0.. except at extreme upper limits. (C.G. about 9 miles abv.

Wiscoy Cr. has higher altitudes, may reasonably be expected to ~~should~~ give a high flood rate at Pike, N.Y. about 7½ miles upstream from site, below that place ~~but~~ ... watershed is narrow. (C.G. about 9½± miles above site)

High floods at remote intervals may vary from 23,000 to 45,0.. cfs

~~125 cfs/ft to 575 cfs/ft on spillway about 126 ft. long~~

Blue print received with letter dated June 9, 1921, revised crest length to 240 ft. ... (Scale on print about ...

Checking such length $\frac{123.5°}{360°} = \frac{280±}{2\times3.14\times130'}$ = 0.305 — Evidently about 4... is to be raised at ends.

Spilling Capacity (Top width = 5', shape not ...

~~Depth on crest of dam, say 14.25' to 21.75'±~~ (126' of cre..

Equalization due to 22 ft above crest,

Area with 7.5' on crest = 22 A.

" " 0.0 " " = 15 A

(El. 1268?) " " 15.0± " " = ... A

240'× 200 cfs = 47,000± cfs

(El. 1260?) — Depth of water on crest

F-5

SUBJECT _____ FILE NO. 3548

ACC. NO. _____ SHEET 4

COMPUTER Yuk Apr 19 71 CHECKED BY _____ 19 _____

MADE IN CONNECTION WITH Dm App #410

REFERENCE _____ CONT'D FROM ACC. 3547

Equalization effect of reservoir:

(Assumed area curve in bottom of Sht 3-Should be)

Depth	Incr.	Area	Σ	1/2S	Volume (marks)	Σ(Volume) Acre-ft
(Crest) 0		15				0
	0.25		31	15.5	3.88	
0.25		16				3.88
	0.45		33	16.5	7.42	
0.7		17				11.30
	0.7		35	17.5	12.25	
1.4		18				23.55
	0.9		37	18.5	16.66	
2.3		19				40.21
	1.4		39	19.5	27.3	
3.7		20				67.51
	3.8		42	21	79.8	
7.5		22				147.31
	2.5		45	22.5	56.2	
10.0		23				203.51
	4.4		47	23.5	103.4	
14.4		24				306.91
	6.6		49	24.5	161.7	
21.0		25				468.71
	1.0		501	25.05	25.05	
22.0		25+				493.76 ≈ 2,153,000 cubic feet
		164				
		368				
		408				

13,370,000 ± cf ÷ 291 sec. @ 46,000 ± cfs (Nearly 5 minutes.)

Determine period required to empty reservoir at rate of 46,000 cfs (Miami flood rate) = 468 seconds ≈ 7.8 Minutes

Say maximum flood runoff of 6" on watershed in 24 hrs =

6" x 2,323,200 ft²/SM/in x 115 Sq. Miles = 1,604,000,000 cf / 24 hrs

Average rate for period of 24 hrs = 1,604,000,000 / 86,400 sec/24 hrs = 18,520 cfs

≈ 161.5 cfs/SM

40 SM watershed estimated x 161.5 cfs/SM

≈ 46,000 cfs adjusted (equali-

22.95 x 4 = 91.8 AF ±

Acc. No. [illegal] Sheet 5

Computer Just June 1921 Checked by

Made in connection with Dam Acc. 410

Reference

Corps form Acc. 2548

Stresses in Dam Section: (Crest length 240±)

By A. R. McKim notes:—

Radius must be < 0.667 L = 0.667 × 227± = 151.5±

Shown by blue print filed June 10, 1921 as 120'

Crest Thickness must be > (RH)(0.003) = {130' × 0.5 × 0.05 = 6.17

(Providing for fullers 1,000 yr. flood (Neglecting equalization = 24,000 cfs)

Note: It is evident that top of dam as proposed, does not measure quite up to the requirements of this rough empirical formula, so test actual stresses in the concrete and rock at ends. Just

Compression in concrete: (Ref. Eng. & Contracting June 9, 1921, p. 567)

$$s = .434\,h\,\frac{R_w}{t} = \frac{.434 \times 15' \pm \times 130'}{5'} = 169.3^{\pm}\ \#/\square''$$ { Checks with Applicants Engr.

Formula by Bligh, p. 101: (More nearly exact.)

$$s = \frac{2 \times 15' \times .434}{\frac{5'}{130'}\left(2 - \frac{5'}{130'}\right)} = \frac{30'}{1.9615} = 172.3^{\pm}\ \#/\square''$$ O.K.

Base thickness: (Formula by Bligh)

$$s = \frac{2Hw}{\frac{b}{R}\left(2 - \frac{b}{R}\right)} = \frac{2 \times (33' + 15') \times .434}{\frac{48'}{130'}\left(2 - \frac{48'}{130'}\right)} = \frac{57.8}{1.9231} = 282^{\#}/\square'' \approx 40.65\ \text{tons}/\square'$$ { Fairly high but considering floor assumed and neglect of bank wall

Sub-foundation Load (Neglecting any vertical beam action)

$$(15' \times 625^{\#}) + (33' \times 150^{\#}/\square') = 5287.5^{\#}/\square' \approx 43\ \text{tons}/\square'$$ { Very low

(Neglecting cantilever action at base)

Ratio of Slenderness

At top $\frac{27'}{5'} = 5.4$ O.K. (Should not exceed 6)

Midway $\frac{27'}{8.64'} = 3.12$ O.K. (Should not exceed 2.

Corps of Acc.

1. Should subfoundation explorations be made other than for satisfactory cut-off trench? (U.S. Geol. Surv. A.H.P. & A.R. rep.

2. What is proposed El. for crest at which water surface area would be 15 acres (Ref-Paper #1, sht. 1.) Capacity 4 million; water surface.

3. What was elevation assumed for maximum flood, for which water surface area was stated as 22 acres, also what capacity between El. of crest and such assumed maximum flow line?

4. Water storage report mentions 1869 flood to have generally exceeded that of 1902. Also mentions flood of 1859.

5. Would falling water endanger safety of structure unless pool is provided of satisfactory depth to kill velocity? Height said to be 30ft. maximum.

6. Vacuum behind sheet of falling water? (S. [illegible] said [illegible]

7. Would they have some factor of safety even tho an inflow rate 46,000 cfs. were assumed? (Miami records used as basis)

8. Specifications not clear as to mixture to be used in the dam proper.

9. Print which accompanied letter dated July 4, 1921 still marked "not thoroughly checked"

10. Such print received with letter dated July 4th shows construction opening 10' x 3' is to be left near center of arched dam presumably at its bottom, but the plans do not so state.

11. Plans and specifications as finally submitted, should bear evidence as to their official adoption by the applicant.

12. Material tags sent June 18, 1924 have not been returned with sample

PLACE	Max. Height	Thickness at C.L.	Thickness at Top	Max. Pressure per sq. in.	Pressure at Upstream Toe	Top Width
Katoomba, N.S.W.	25	20.29	3.0	233	220	320
Cascadilla Cr., Ithaca, N. Y.	25	40.0	2.5	189	70	96
Picton, N.S.W.	28	13.62	7.0	186	120	112
Winchester, Ky.	31	8.58	4.83	498	318.4	407
Qn. Charlotte Vale, N.S.W.	32	3.65	3.0	155	90	113
Parkes, N.S.W.	33.5	13.5	3.0	373	300	540
Lithgow No. 1, N.S.W.	35	10.88	3.5	155	100	178
Barren Jack, N.S.W.	38	3.00		264	80	
Deer Allum, India	39.0	8.5		164	82	178
Woollongong, N.S.W.	42	11.62	3.5	311	200	535
Cootamundra, N.S.W.	46	13.0	3.0	389	250	640
Wellington, N.S.W.	48	10.0	3.0	311	150	350
Bear Valley, Cal.	(48 (Total 64)	8.4 48 ft.)	3.17	825	335	300
Mudgee, N.S.W.	50	18.0	3.0	311	253	498
LasVegas, N.Mex.	50	15.50	4.0	350	250	210
(built)(Proposed)	95	43.30	4.0	300	250	390
Parramatta, N.S.W.	62	15.0	4.8	223	160	225
Lewiston, Idaho	55.5	14.5	5.33	475	286.5	288
Crowley Cr. Malheur Co. Ore.	60	5.2	3.0	350	70	170
"(projected 1914)	90	9.2	3.2	305	72	223
Tamworth, N.S.W.	61	21.5	3.0	311	250	440
Goodwin Dam, Stanislaus River, Cal.	(61 (total 70)	12.0	8.0	297	135	233
Medlow, N.S.W.	65	8.96	3.5	186	60	124
Upper Otay, Cal.	75	14	4	604	359	350
Lithgow No. 2. N.S.W.	87	24.0	3.0	155	100	221
Huacal, Sonora, Mex.	88.5	12.83	3.5	226	76	140
Sweetwater, Cal.	90	46	12	188	222	380

APPENDIX G

PREVIOUS INSPECTION REPORTS/ AVAILABLE DOCUMENTS

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DAM INSPECTION REPORT
(By Visual Inspection)

89 East Ave
Rochester, NY 14604

Dam Number	River Basin	Town	County	Hazard Class	Date & Inspector
565	Genesee	Hume	Allegany	B-C	6-22-77 KWH

Stream = Wiscoy Ck Owner = Rochester G+E

Type of Construction

- [-] Earth w/Concrete Spillway
- [·] Earth w/Drop Inlet Pipe
- [ ] Earth w/Stone or Riprap Spillway
- [x] Concrete
- [ ] Stone
- [ ] Timber
- [ ] Other _____

Box 6 gal.

Use

- [ ] Water Supply
- [x] Power
- [ ] Recreation - [ ] High Density
- [ ] Fish and Wildlife
- [ ] Farm Pond
- [ ] No Apparent Use-Abandoned
- [ ] Flood Control
- [ ] Other _____

Estimated Impoundment Size 10 Acres ### Estimated Height of Dam above Streambed 33 Ft.

Condition of Spillway

- [x] Service satisfactory
- [ ] In need of repair or maintenance
- [x] Auxiliary satisfactory
- [ ] In need of repair or maintenance

Explain: _____

Condition of Non-Overflow Section

- [x] Satisfactory
- [ ] In need of repair or maintenance

Explain: _____

Condition of Mechanical Equipment

- [x] Satisfactory ?
- [ ] In need of repair or maintenance

Explain: _____

Siltation [ ] High [ ] Low

Explain: _____

Remarks: _____

Evaluation (From Visual Inspection)

- [ ] Repairs req'd. beyond normal maint.
- [x] No defects observed beyond normal maint.

9-22-24-3000 (9-1206)

30D 565 Glen NY461

STATE OF NEW YORK

DEPARTMENT OF

State Engineer and Surveyor

ALBANY

Report of a Structure Impounding Water

To assist in carrying out the provisions of Section 22 of the Conservation Law, being Chapter LXV of the Consolidated Laws of New York State, relating to safeguarding life and property and the erection, reconstruction, or maintenance of structures for impounding water, owners of such structures are requested to fill out as completely as possible this report form for each such dam or reservoir owned within the State of New York for which no plans or reports relative thereto are on file in this Department, and to return this report form, together with prints or photographs explanatory thereof to this department.

1. The structure is on Wiscoy Creek flowing into Genesee River in the Town of Hume County of Allegany and 1900 feet upstream from the main highway bridge located in the village of Wiscoy, N. Y.
(Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

2. Is any part of the structure built upon or does its pond flood any State lands? No

3. The name and address of the owner is Genesee Valley Power Co., Fillmore, N. Y.

4. The structure is used for Hydro-electric power

5. The material of the right bank, in the direction with the current, is shale rock; at the spillway crest elevation this material has a top slope of 8 inches vertical to a foot horizontal on the center line of the structure, a vertical thickness at this elevation of unknown feet, and the top surface extends for a vertical height of 60 feet above the spillway crest.

6. The material of the left bank is shale rock; has a top slope of 20 inches to a foot horizontal, a thickness of unknown feet and a height of 60 feet.

7. The natural material of the bed on which the structure rests is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.)
Shale rock

8. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. The material is a black shale rock, impervious and weathers slightly when exposed to air.

9. If the bed is in layers, are layers horizontal or inclined? Horizontal If inclined what is the direction of the horizontal outcropping relative to the axis of the main structure and the inclination and direction of the layers in a plane perpendicular to the horizontal outcropping?

10. What is the thickness of the layers? Unknown. There is exposed bedrock below the dam.

11. Are there any porous seams or fissures? Not at dam site

12. The watershed at the above structure and draining into the pond formed thereby is 115 square miles.

13. The pond area at the spillway crest elevation is 10 acres and the pond impounds 10,000,000 cubic feet of water.

14. The maximum known flow of the stream at the structure was — cubic feet per second on —
(Date)

15. Has the spillway capacity ever been exceeded by a high flow? No

Can any possible flood flow from the pond otherwise than through the wastes noted under 17 and 18 of this report? No. If so, give the location, the length and the elevation relative to the spillway crest and the character and slopes of the ground of such possible wastes

16. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the above structure. Describe the location, the character and the use of buildings below the structure which might be damaged by any failure of the structure; of roads adjacent to or crossing the stream below the structure, giving the lowest elevation of the roadway above the stream bed and giving the shape, the height and the width of stream openings; and of any embankments or steep slopes that any flood could pass over. Also indicate the character and use made of the ground below the structure. A failure might destroy the highway bridge and cause some property damage. The bridge is located at Nisqually 1900 below the dam. The abutments are 100 feet apart and the roadway is 15 feet above the stream bed. Most of the adjacent land is unused a

17. WASTES. The spillway of the above structure is 240 feet long in the clear; the waters are held at the right end by a wall the top of which is 6 feet above the spillway crest, and has a top width of 3 feet; and at the left end by a wall the top of which is 6 feet above the spillway crest, and has a top width of 1 feet.

18. There is also for flood discharge a ~~pipe~~ 4'x4' Gate ~~inches inside diameter~~ and the bottom is 120 feet below the spillway crest; and a (sluice, gate outlet) 5 feet wide in the clear by 5 feet high, and the bottom is 30 feet below the spillway crest.

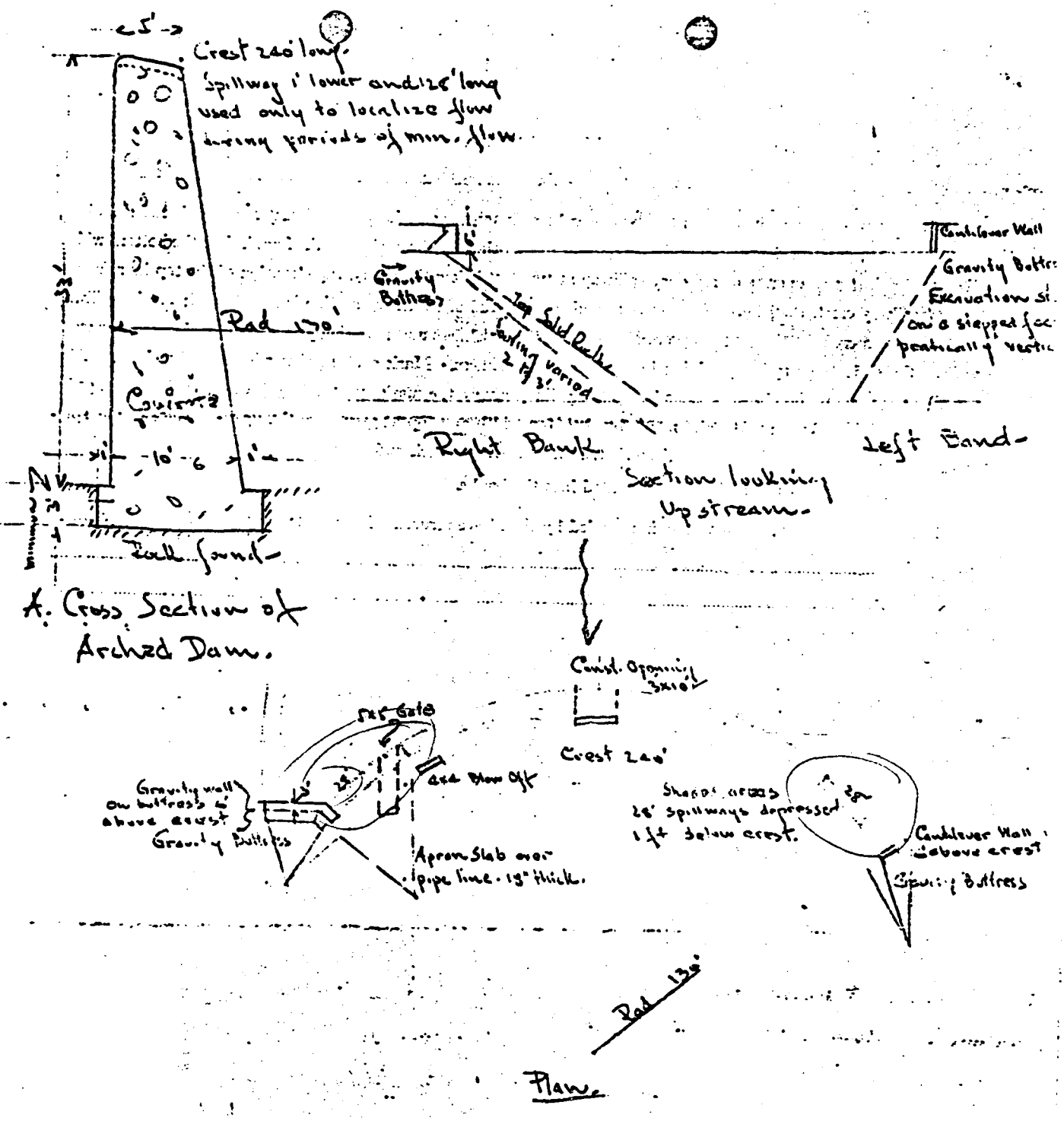
20 feet wide and 1½ feet thick. The downstream side of the apron has a thickness of ——— feet for a width of ——— feet

20. Has the structure any weaknesses which are liable to cause its failure in high flows? No

21. SKETCHES. On the back of this report make a sketch to scale for each different cross-section of the above structure at the greatest depth; giving the height and the depth from the surface of the foundation, the bottom width, the top width (for a concrete or masonry spillway at two feet below the crest), the elevation of the top in reference to the spillway crest, the length of the section, and the material of which the section is constructed; on the spillway section show a cross section of the apron, giving its width, thickness and material, and show the abutment or wash wall at the end of the spillway, giving its heights and thickness. Mark each section with a capital letter. Also sketch a plan; show the above sections by their top lines, giving the mark and the length of each; the openings by their horizontal dimensions; the abutments by their top width and top lengths from the upstream face of the spillway section; and outline the apron. Also sketch an elevation of each end of the structure with a cross section of the banks, giving the depth and width excavated into the banks.

22. WATER SUPPLY. The waters impounded by the above structure have (not) been used for a public water supply since Construction

at the rear lots of Alsey and the farmlands below.



The above information is correct to the best of my knowledge and belief.

Ithaca, N.Y. — J. M. Whittaker

(Address of signer) (Signature)

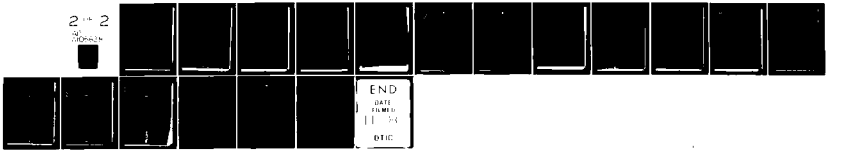
Jan. 2, 1926 — Engr. in charge of design & Const.

(Date) (If person signing for owner should indicate his title or authority)

Gannett Leelye & Fleming Inc.

Harrisburg, Pa.

AD-A105 838 ERDMAN ANTHONY ASSOCIATES ROCHESTER NY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. WISCOY DAM (INVENTORY NUMBER N.Y. --ETC(U)
AUG 81 R J FARRELL DACW51-81-C-0017
UNCLASSIFIED NL



L. C. HULBURD, Division Engineer

STATE OF NEW YORK

H/L DEPARTMENT OF STATE ENGINEER AND SURVEYOR

WESTERN DIVISION

ROCHESTER Oct 1, 1921.

SUBJECT:- Wiscoy dam #565
Genesee.

OFFICE STATE ENG.
OCT -3 1921
Albany

DEPT. STATE ENG
RECEIVED
OCT -3 1921
OFFICE SPL. DEPUTY.

Hon. Frank M. Williams,
State Engineer,
Albany, N. Y.

Genesee Power Co.

Dear Sir:-

On September 30th I made an inspection of the foundation for the northerly abutment of the dam being built by the Fillmore Electric Co., on Wiscoy creek, near Wiscoy, N. Y. I found that the excavation had been carried about 3-feet into ledge rock for the bottom of the dam and well into solid rock at the ends of the arch. The foundation I considered satisfactory and advised the Engineer-in-charge that the laying of masonry might proceed on the foundation as then uncovered.

This is the last portion of the foundation, concrete being well up on the balance of the dam, and no further inspections will be made by this office unless you so direct.

Very truly yours,

L. C. Hulburd

Division Engineer.

L. C. HULBURD, Division Engineer

STATE OF NEW YORK
DEPARTMENT OF STATE ENGINEER AND SURVEYOR
WESTERN DIVISION

W/L

ROCHESTER

Aug. 26, 1921.

SUBJECT:— Wiscoy dam #565
Genesee.

RECEIVED
OFFICE STATE ENG.
AUG 27 1921
REF'D TO
ANS'D

Hon. Frank M. Williams,
State Engineer,
Albany, N. Y.

Dear Sir:-

In conformity with Mr. Waters' letter of August 25th, andmmeeting the request of Resident Engineer Whitman, at the Wiscoy dam, of the Fillmore Electric Co., I sent Senior Assistant Engineer Wildes to inspect the south abutment foundation yesterday. Mr. Wildes reports that the excavation for this abutment has been carried well into the hill side and stepped up on firm and well preserved rock beds. Excavation has also been made for a gravity wall, the top of which will be some 6 or 8' higher than the crest of the main structure - this wall extending into the hill side upstream from the arch and at an acute angle therewith, and being designed for the purpose of diverting the floods to the center of the spillway. The excavation for this wall, as well as for the abutment, is satisfactory.

It should be understood that the rock shatters along various cleavage planes, but as it stands in the foundation, these joints, or cleavage planes, are tight and all loose rock has been carefully cleaned off. On the upper steps of the excavation there was still some little dirt, which the Engineer was advised to flush off in order to make sure that any possible cracks would be exposed and filled with grout before the concreting operation began. This the Engineer stated that they intended to do.

Concreting work was actively in progress on the lower level and the stream was on the point of being diverted through the forms of the 5' penstock through the dam. The north abutment excavation had been started and so far looks very favorable. This section is expected to be ready for inspection the middle of next week.

Very truly yours,

L. C. Hulburd

Division Engineer.

ARLieK-P.

In re Dam 565, Genesee Watershed at Wiscoy

August 15, 1921.

Fillmore Electric Co.,
Fillmore, N. Y.

Gentlemen:-

We received letters dated August 9th, and 12, from your engineers asking permission to omit the cutoff wall of Dam 565, Genesee Watershed at Wiscoy. From your engineers' reports and those of our Division Engineer in Rochester, rock bed where excavated to a depth of 3 ft. appears to be a dense gray stone with no open seams. If the bed is of this character throughout, is carried well into sound rock, and all soft and disintegrated rock and all fragments of shattered or loosened rock removed, we approve your request to omit the cutoff wall of this dam which was approved by us on July 23, 1921.

The bed should be very carefully examined as the foundations are excavated and if any indications of faults and seams are found excavation should be carried to a depth to fully intercept any water bearing strata.

Very truly yours,

FRANK M. WILLIAMS,
State Engineer,

BY _____
Chief Clerk

L. G. Huntley, Division Engineer

STATE OF NEW YORK
DEPARTMENT OF STATE ENGINEER AND SURVEYOR
WESTERN DIVISION
ROCHESTER

RECEIVED
OFFICE STATE ENG.
AUG 15 1921
REPLY TO
ANS'D

Subject:- Wiscoy Dam — August 14, 1921.
Inspection of foundations

Hon. Frank M. Williams
State Engineer
Albany, N. Y.

Dear Sir:

Pursuant to instructions in your letter of Aug. 3rd an inspection of the site of the proposed dam on Wiscoy creek at Wiscoy, N. Y. was made on Aug. 9th. The inspection was made by Sr. Asst. Eng'r. A. R. Morse detailed from this office. Enclosed herewith is copy of his report under date of Aug. 9th. As you will note from Mr. Morse's report the cut off trench was not excavated at the time of his inspection and the report has been held until the proposed test pit was ready for examination. Upon advise from the Eng'r. in Charge that a test pit had been excavated to depth of cut off shown on the approved plan I went to Wiscoy yesterday, Aug. 13th, and inspected the site.

The pit which has been excavated is along the line of the cut off trench about 25 feet toward the center of the creek from the penstock opening. It is about 6 feet long, 3 feet wide and 5 feet deep. The rock encountered is a dense gray stone of fine texture and no open seams. With such a character of foundation I do not consider a cut off necessary and beleive that it would be safe to omit it. From the foundation uncovered at present there is nothing to indicate a different character of rock, however, the Engineer in Charge should examine the rock very carefully as the foundations are excavated and if any indications of faults or seams are found excavation should be carried to a depth to fully intercept any water bearing strata. I think Mr. Whitman, Res. Eng'r. understands this and that he is giving the matter his careful attention.

If approval is given for omitting the cut off trench special care should be exercised in removing all fragments of rock from the foundation which may have been shattered or loosened in the blasting operations.

The only unsatisfactory indication is the amount of disintegration which has occurred on the sides of the gorge in which the dam is located. At the toe of the slope the rock has been protected by a considerable depth of earth which has apparently slid down the slope. Above this protection of earth

the rock has disinte[illegible]ated to a depth not dete:[illegible]ned as yet. It is essential that th[illegible] excavation be carried we:[illegible] into sound rock and if this is not found in close proximity to the location shown on the plan some modification of the abutments may be desirable. Excavation is now underway for the abutment adjaqent to the penstock but practically nothing has been done on the other abutment.

The company propose to start the placing of masonry on the part of foundation where excavation has been completed if approval of omitting the cut off is granted.

I am enclosing herewith plan which accompanied your letter of Aug. 3rd. When plans are finally revised and approved I would like a copy for our files.

Very truly yours,

R. C. Faulkner

Division Engineer.

re McKinn

GANNETT, SEELYE & FLEMING
(INCORPORATED)

HARRISBURG, PA.
ERIE, PA.
MEMPHIS, TENN.

ENGINEERS
204 LOCUST STREET
HARRISBURG, PENNA.

RECEIVED
OFFICE STATE ENG.
AUG 15 1921
REF'D TO.....
ANS'D.....

Wiscoy, N.Y.
August 12, 1921.

Mr. Ellis J. Stanley,
Conservation Commission,
Albany, N.Y.

Dear Sir:-

In re:- Concrete Arched Dam, Wiscoy, N.Y.
565 Genessee Watershed

On August the 9th., I wrote to you requesting your approval for the elimination of the cut off wall subject to the approval of the State Engineer. The approval was requested as stated because the State Engineer inspected the excavation and could take up any questions about the work here in the field.

Mr. Wildes of the State Engineer and Surveyor Department, Western Division informed me today that this class of work and the approval of designs have been transfered to the State Engineer. If I am correct in this matter will you kindly forward the letter above mentioned to the State Engineer so that we can get this through with the minimum delay. Our excavation has been completed and we are very anxious to start the form work.

Very truly yours,

Fillmore Electric Company,
Gannett, Seelye and Fleming, Inc. Agts.
S. N. Whitman
S.N.Whitman, Resident Engineer.

GANNETT, SEELYE & FLEMING
(INCORPORATED)

HARRISBURG, PA.
ERIE, PA.
MEMPHIS, TENN.

ENGINEERS
304 LOCUST STREET
HARRISBURG, PENNA.

RECEIVED
OFFICE STATE ENG.
AUG 10 1921
REF'D TO
ANS'D

Wiscoy, N.Y.
Aug.9,1921.

Mr. Ellis J. Stanley,
Conservation Commission,
Albany,N.Y.

In re: Concrete Arched Dam, Wiscoy, N.Y.
565 Genesse Watershed.

The rock footing excavation has been completed on the above project and the material is of a very good quality and contains but very few seams. The seams are light and the rock is dry and sound on the South side of the center line of the dam.

We are considering eliminating the cut off wall as designed provided our test pit and future drill holes disclose good material. Approval for the elimination of this wall is requested subject to the approval of the State Engineer.

Very truly yours

Gannett, Seelye and Fleming,

S.N.Whitman.

Wiscoy Dam.
Inspection of Foundation.

Aug. 9, 1921.

Mr. L. C. Hulburd,

Division Engineer,

Rochester, N. Y.

Dear Sir:-

On August 8, 1921, I inspected the foundation for a dam at Wiscoy No. 565, Genesee, on Wiscoy creek, being constructed by the Fillmore Electric Co., and would report as follows:

The site of the dam is about half a mile west of Wiscoy village on Wiscoy creek. The site is on a rock formation of dense limestone, which is in beds of one foot to three feet or more in thickness, the beds or seams are very close to the level, and from an inspection of exposed faces down stream it does not erode badly. There is a fault occurring every twenty feet more or less, and diaganol to the axis of the stream. These faults are very regular and very close contact is shown on exposed surfaces.

The foundation of approximately one-third of the dam from the south abutment is completed to an average depth of three feet and shows a good foundation. Work has started on the south abutment, and one bench has been completed and gives a good bearing into solid rock. The face of rock at the abutments shows some weathering, but on cutting in to a depth of one foot or so, solid rock is encountered, and if stepped and notched properly will give a good foundation and bearing for the abutments.

I was not able to inspect the cut-off as none of it had been excavated. The Contractor expects to have a test hole excavated by Friday August 12, so an inspection could be made, and would like an inspection made at that time if possible.

The electric company propose to eliminate the cut-off in case the test pit develops a dense formation with close seams and no bad faults. The matter will be brought up after the test pit is open. They propose to test drill the whole foundation in order to see if the formation continues the length of the dam. The local engineer, Mr. Whitman, asked if we could arrange to inspect the cut-off test pit, and I told him I would report to you

OVER

and that we would arrange to inspect it when he was ready, which he said would be Friday.

The dam is on a good foundation and will have good abutment bearing, and in case the test pit develops nothing serious the cut-off could be eliminated. As to flood hazard, the valley opens into the wide flats of the Genesee before any serious damage would be done in case of a failure.

Very truly yours,

A. R. Morse

ARM/W

Senior Assistant Engineer.

ARMcK-M

August 3, 1921

Mr. L. C. Hulburd,
Division Engineer,
Triangle Bldg.
Rochester, N.Y.

Dear Sir:

Can you have one of your engineer inspect the footing of the curved concrete dam No. 565 Genesee, which the Fillmore Electric Company are constructing at Wiscoy?

The work is being done by Messrs. Cornett, Seelye & Fleming, Engineers, and their representative is Mr. Frank L. Bolton, District Engineer, Wiscoy, N.Y., who should be notified of the date of the proposed inspection. They desire to have the dam inspected about August 6th. The train leaves Rochester, (Pennsylvania Railroad) at 8.15 A.M. for Rossburg. Rossburg is on U.S. G.S. sheet #51 and the dam at Wiscoy is on U.S.G.S. sheet #70. The dam is on the Wiscoy Creek, one half mile west of Wiscoy.

You want to be particular to note whether all the loose and soft rock has been removed and the depth to which they have gone into the rock at the ends.

Enclosed find print of proposed dam.

Yours very truly,
FRANK L. WILLIAMS,
State Engineer,

BY _____
Chief Clerk.

STATE OF NEW YORK
STATE ENGINEER AND SURVEYOR
ALBANY

ADDRESS ALL COMMUNICATIONS TO
FRANK M. WILLIAMS, STATE ENGINEER

FRANK M. WILLIAMS
State Engineer
R. G. FINCH
Deputy
G. W. CODWISE
Confidential Assistant
CHAS. R. WATERS
Chief Clerk

ARMcK-F.

July 23, 1921.

Hon. Frank M. Williams,
State Engineer and Surveyor,
Albany, N. Y.

Dear Sir:-

The Fillmore Electric Company of Fillmore, N. Y., has submitted an application (our Serial No. 410), together with plans, specifications and calculations, for the construction of a curved concrete dam at Wiscoy, N. Y., (our dam No. 565, Genesee Watershed) designed by Gannett, Seelye & Fleming Inc., of Erie, Pa., engineers for the Fillmore Electric Company.

I inspected the site of the proposed dam on June 17, and have written a report thereon. The bed and sides for a height of 70 ft. are of hard shale, somewhat weathered on the south side.

The plans and specifications submitted have been examined by Junior Engineer Henry and the work has been checked by me. I find the dam as proposed to have ample dimensions for the protection of life and property and therefore respectfully recommend your approval.

Very truly yours,
Alex Rice McKim
Inspector of Docks and Dams.

MEMORANDUM REGARDING DAM NO. 565, GENESEE WATERSHED
WISCOY CREEK ABOVE WISCOY, N. Y.
FILLMORE ELECTRIC CO., OWNER
APPLICATION SERIAL NO. 410
(Ref. Comp. Acc. 3503 et seq.)

PAPERS

1. April 18, 1921, letter report by Frank L. Bolton as District Engineer representing Messrs. Garnett, Seelye & Fleming, Inc., Engineers for applicant.

2. Application Serial No. 410, dated April 18, 1921.

3. April 21, 1921, letter to applicant requesting that dam be designed with some factor of safety in case of a flood of about 46,000 c.f.s.;

4. June 9, 1921, letter transmitting blue print, computation sheets and data sheet in re other arch dams and four photographs at site;

5. June 18, 1921, report on inspection of site by Inspector of Docks and Dams, Mr. A. R. McKim.

6. June 22, 1921, letter transmitting specifications;

7. July 4, 1921, letter transmitting prints of revised drawings.

SITE

The information at hand indicates that the dam is to be built across the Wiscoy Creek at a point about 1900 feet below the mouth of its principal tributary, known as the East Koy Creek. The proposed site is also located a short distance above the upper prong of the three falls of the Wiscoy Creek at the Village of Wiscoy, Town of Hume, Alleghany County, N. Y.

The report made by Mr. A. R. McKim, Inspector of Docks and Dams with this Department, confirms the statements of applicant's Engineer, and photographs submitted by him, to the effect that the site selected is in a deep gorge of good quality shale, which is exposed in the stream bed and the full height of the north bank where it is almost vertical, and many feet higher than the water above the dam could reach. The rock on the south side was exposed in three test pits each about 4 feet deep and this surface appears to have a slope slightly steeper than 1 on 1.

The applicant's Engineer reported that the layers of the ledge rock vary from 1" to about a foot in thickness and that the three falls in the creek within about 1000 feet below the site have an average height of about 20 feet, and that the constant flow of the creek has not materially worn the rock at the foot of such falls. Only a few minor seams are exposed in the stream bed and the plans indicate that the cutoff wall beneath the upstream heel of the dam would extend to a depth of 10 feet into the rock. Inspector McKim's report concluded with a statement that the site is a good one for a curved dam.

GENERAL DESCRIPTION

The application plans and specifications submitted indicate that the proposed structure would consist of a concrete arch dam butting into the solid sides of the gorge; construction material to be 1:2:4 Portland cement concrete with not to exceed 50% (by volume) of hard stones properly embedded therein; the radius of the extrados of the arch is to be 130 feet and constant; the length of the dam measured from extreme ends would be about 280 feet; maximum angle subtended between the radii at the extreme ends 123° 30'; bottom width 10 feet; maximum exposed height 33 feet; top width 5 feet.

A concrete pipe having an interior diameter of 5 feet is to penetrate the dam near the foot of the south bank. A construction opening 10' x 3' is also shown near the center of the channel bottom.

RELATION TO PUBLIC SAFETY

The applicant's Engineer has orally admitted that a failure of the proposed dam, under worst conditions, would doubtless cause the destruction of some of the dwellings on at least one street in the village of Wiscoy. His report also stated that a flood in the year 1902 caused the destruction of several small dams and the release of "some 50 acres of pondage" with the result that the mills at Wiscoy were washed away and much other damage resulted. A newspaper account of the same flood related that several residences and barns were also washed away.

Several of the dams, the failure of which is believed to have added to the property damage in 1902, have since been replaced and the proposed dam would doubtless impound several times as much water as the others combined. It may therefore be determined with reasonable certainty that for the proper protection of public safety, the proposed dam should be securely constructed.

TRIBUTARY WATERSHED

The drainage area above the proposed site is about 715 square miles and is almost equally divided by the line separating the catchment basin of the principal tributary (East Koy Creek) and the upper watershed of Wiscoy Creek.

The difference in elevation shown by the U. S. C. S. maps between the proposed site and the extreme limits of the East Koy Creek watershed is about 800 feet but the ground surface is hilly throughout. The center of gravity of this northerly portion of the watershed is about 9 miles above such site although the general outline is somewhat elongated. The country to the south which is drained by the Upper Wiscoy Creek is somewhat more rugged and is characterized by higher elevations. The center of gravity of this southerly portion of the watershed is almost 9-1/2 miles above the dam site, but high rates of flood discharge per unit of area above the Village of Pike (channel distance about 7-1/2 miles upstream from the site) may reasonably be expected. Below Pike this portion of the watershed is narrow.

MAXIMUM FLOODS

While little information is available as to the soil conditions and the percentage of the tributary area which is cultivated, it seems probable that the characteristics of the watershed would not be less favorable for producing high flood discharge rates than portions of the famous "Miami district of Ohio" and the studies of the Miami engineers indicate that the maximum precipitation rates are somewhat higher in the vicinity of Wiscoy Creek than in the Miami district.

It appears that the flood conditions in the southwest portion of New York State were serious in the years 1865, 1889, and 1902, and it seems probable that at intervals, possibly remote, the flood rates entering the pond above the proposed dam may attain values between 23,000 c.f.s. and 46,000 c.f.s. (or a limit of 400 c.f.s. per square mile). It would therefore seem reasonable to require that a dam, the failure of which would doubtless cause great destruction of property and possibly loss of lives, should embody some factor of safety even though such extreme flood conditions should occur as estimated above.

SAFETY OF THE STRUCTURE

The applicant's Engineers have amended their plans to provide for a safe structure when passing a flood rate exceeding 46,000 c.f.s., after excluding all backwater resistance and some degree of equalization which would result from the volume of water necessarily impounded in the pond above the elevation of the spillway crest, when discharging such a considerable

volume of water.

The computations made at this office, indicate results only slightly exceeding the values stated by the applicant's Engineers and are as follows:

Radius of extrados (130 feet) would be less than the empirical limit of 2/3 its maximum length.

Ratio of slenderness (length divided by thickness) at top would not exceed the empirical value of 75.

Ratio of slenderness at mid depth of water during the times of maximum flood would not exceed the empirical value of 25.

Maximum compression within the concrete or thrust upon the natural rock walls of the gorge, about 280 pounds per square inch or 20-1/4 tons per square foot.

If built with satisfactory materials and in accordance with the revised plans and specifications it would therefore appear that the proposed dam should safely resist all destructive forces which may be reasonably anticipated or assumed.

Respectfully submitted

Glen A. Henry

Junior Assistant Engineer

To A. R. McKim, Inspector of Docks and Dams.
July 13, 1921

STATE OF NEW YORK—CONSERVATION COMMISSION

TITLE: Proposed concrete arched dam, Wiscoy Creek at Wiscoy, Allegany County, N. Y. - Fillmore Electric Co's. Application No. 410. FILE NO. Dm 565-G ACC. NO. SHEET

WORK BY J. W. Henry, July 8, 1921 INCREASE BY

MADE IN CONNECTION WITH oral instruction by Division Engineer, A. H. Perkins

REFERENCE

Having examined the revised print which accompanied letter dated July 4, 1921 from Gannett, Seelye & Fleming, Engineers for the applicant named above, and having noted the contents of such letter, the writer respectfully recommends that a reply be made substantially as follows. -

* *

Dam 565 Genesee.

Subject: Proposed concrete arched dam
Wiscoy Creek, above Wiscoy,
Allegany County, N. Y.
Fillmore Electric Co's. Application #410.

Messrs. Gannett, Seelye & Fleming, Engineers,
Tenth Floor, Ariel Building, Erie, Penna.

Attention: Frank L. Bolton, District Engineer.

Gentlemen:-

From an examination of the file relating to the dam about which you wrote on July 4, 1921, it appears that you were to submit "final plans," and further - that by letter dated June 28, 1921 your attention was called to a portion of your specifications relating to concrete, the meaning of which was uncertain.

The blue print received, accompanying your letter dated July 4, 1921, bears the notation "not thoroughly checked," and lacks evidence as to its official adoption by the applicant. Such print also shows, by plan, the location of a 10-foot by 3-foot construction opening, which would presumably be formed at or near the stream bottom, but no elevation was stated to determine this point with certainty.

Please submit specifications and plans including the revisions already suggested, and bearing evidence as to official adoption by the applicant. On July 1st the administration of those provisions of the Conservation Law relating to the supervision exercised over dams for the purposes of public safety was transferred from the Conservation Commission to the State Engineer and Surveyor, to whom your future correspondence should be addressed.

GANNETT, SEELYE & FLEMING
(INCORPORATED)

HARRISBURG, PA.
ERIE, PA.
MEMPHIS, TENN.

ENGINEERS
TENTH FLOOR, ARIEL BUILDING
ERIE, PENNA.

July 4, 1921.

Conservation Commission,
State of New York,
Albany, N.Y.

File No. Dam 555 Genesee

Attention A.H.Perkins,
Division Engineer.

Gentlemen:

Enclosed please find blue print for dam on Miscoy Creek, for Fillmore Electric Co.

You will note that we have made the crest on a slope, added reinforcing, and show the North Abutment, all of which was not shown on the original print sent you several weeks ago.

We find that with a sloping crest, as shown, it will not be necessary to add a "lip" at the top of the dam for throwing the water away from the toe of the dam.

In reference to the specifications, on page two, under the Caption Class A Concrete, please add at the end of the page, after "and abutments of the dam.", the words, and the dam proper. This will cover your question as to the class of concrete for the dam proper.

Very truly yours,

GANNETT SEELYE & FLEMING INC

Frank L. Bolton.
District Engineer.

Rec'd 8 Jy '21 by Jas. No at office of CONSERVATION COMMISSION

						DATE
INFOR.						
REFD.						
CONF.						
PR. RPT.						
PR. RPLY.						
ACKN.						
FOL. UP						
ATD. TO						
FILE						

Form W-67
Rev. 1920

0461

Filed April 19 1921

Disposition Ap. July 23-21. Rec'd 1921

Inspected site June 10 - August 13 1921

Foundation seen 19

Construction O. K. 19

Dam 565 Genesee Watershed

Serial No 410

Transmitted to Albany April 21 1921.

APPLICATION FOR CONSTRUCTION OR RECONSTRUCTION OF A DAM

FILLMORE NEW YORK
(Address of Applicant)

Application is hereby made to the Conservation Commission of the State of New York, in compliance with the provisions of Chap. LXV of the Consolidated Laws, the Conservation Law, for approval of the detailed specifications and plans, marked To be forwarded later

herewith submitted for the {construction / reconstruction} of the dam located as stated below. All provisions of law will be complied with in the erection of the said dam.

LOCATION AND GENERAL DATA

Site of dam on WISCOY CREEK NEW YORK
(Name of stream)

a branch of GENESEE RIVER (Name of stream), within the limits of the town of HUME WISCOY, County of ALLEGANY

(Give approximate distance from well-known bridge, dam, village or mouth of stream, so that the exact site may be readily located on map of the State)

1900 feet below Junction of Wiscoy and East Koy Creeks

Purpose of dam Water Power

Reasons for making changes in existing structure /////

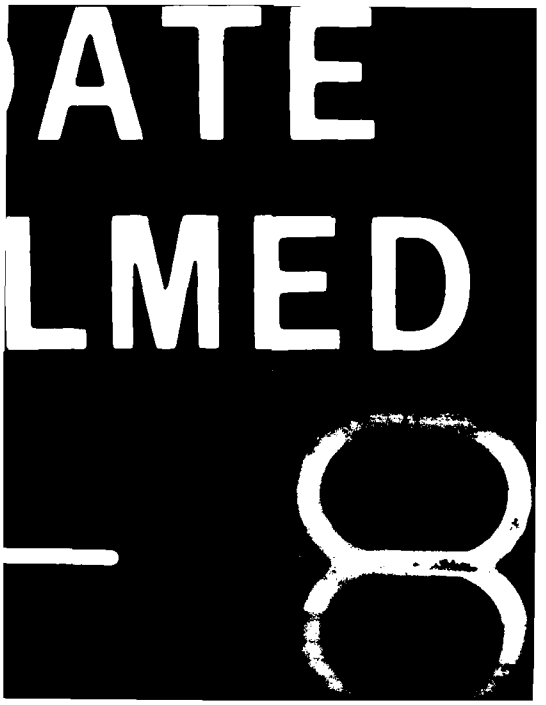
April 19 1920
(Date)

{Signature of applicant} FILLMORE ELECTRIC CO.

GARRETT SCALYE & FLEMING INC
Consulting Engineers
(A person executing for applicant should indicate his title or authority)

By Thomas L. Fleming
District Engr.

Address
Garrett Scalye & Fleming Inc
10th Floor Ariel Bldg
Erie Pa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